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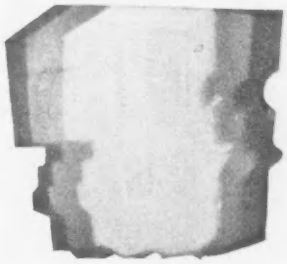

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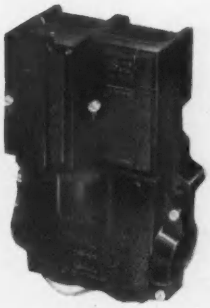

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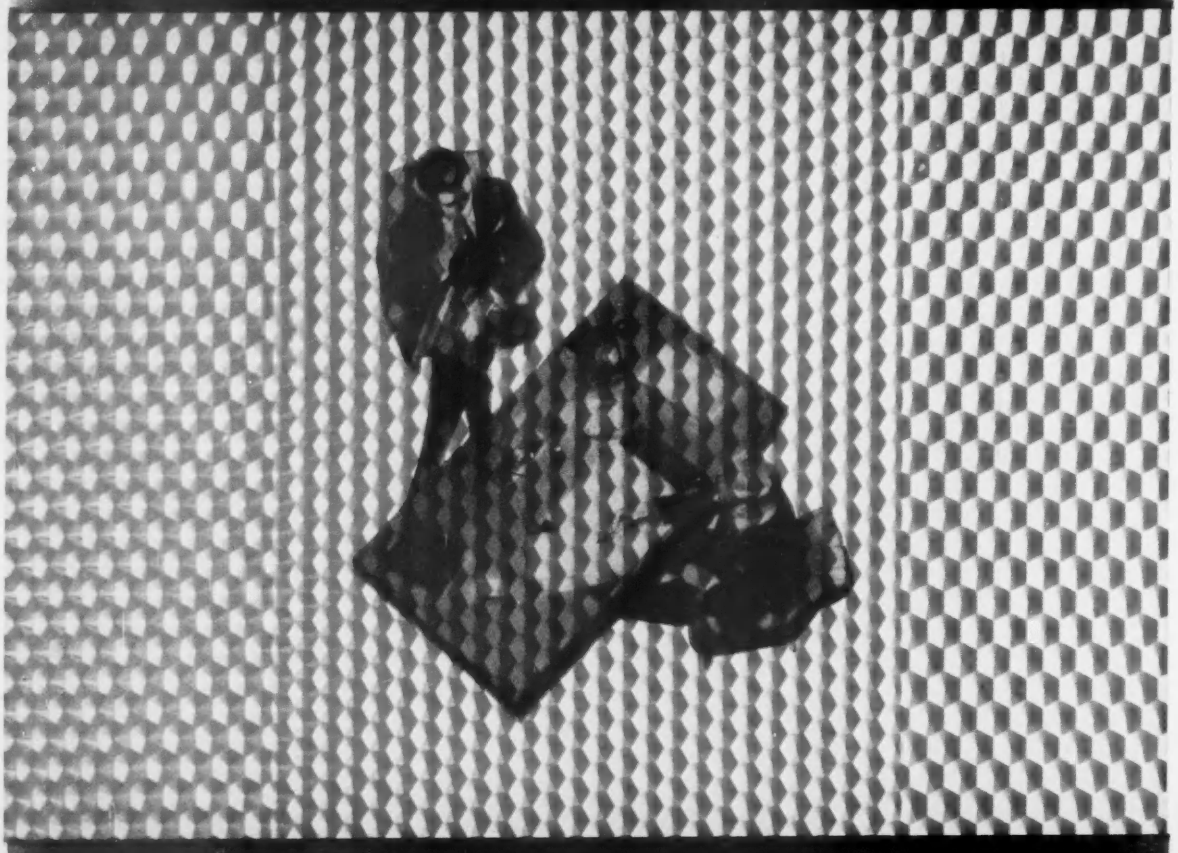

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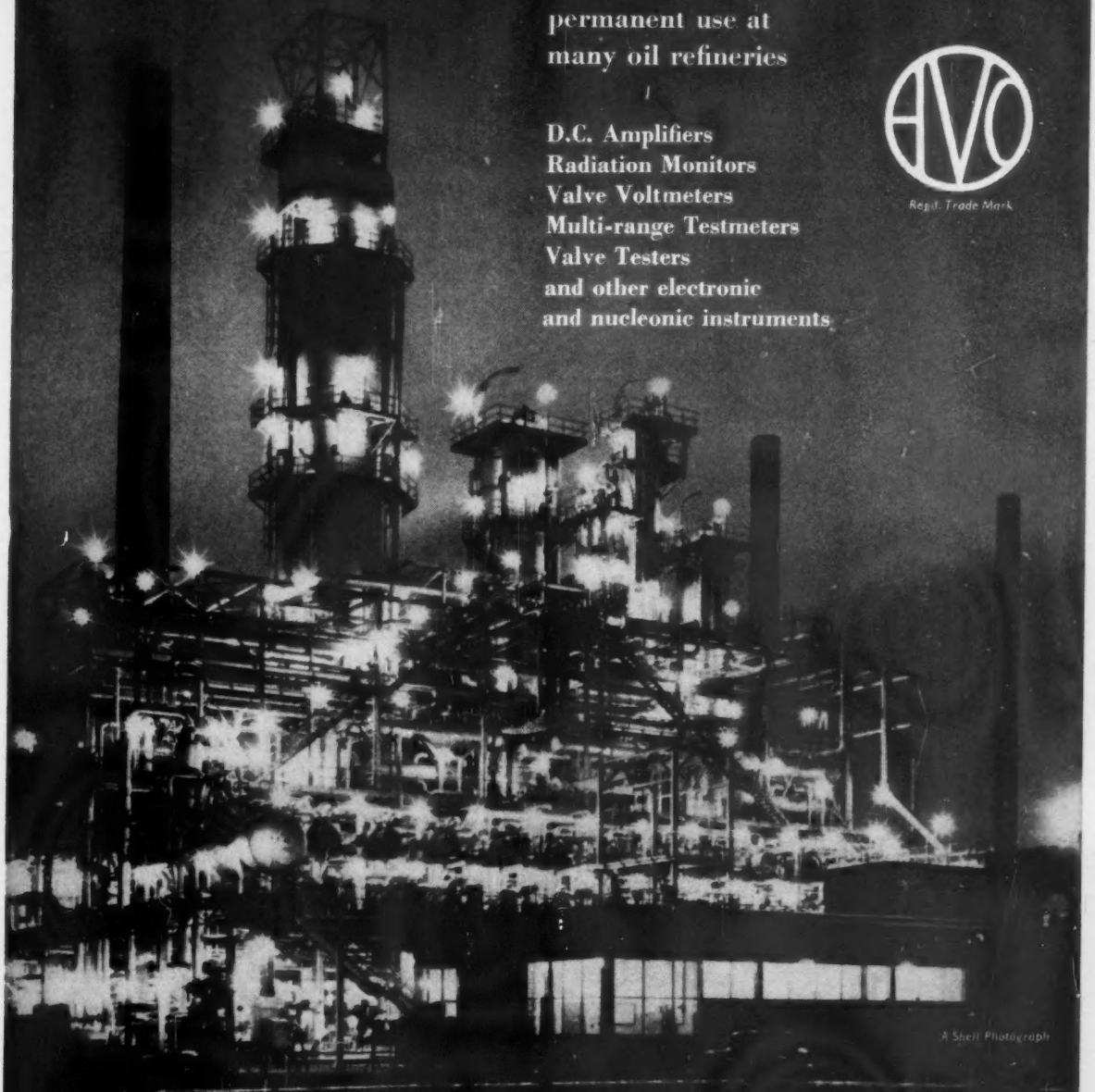

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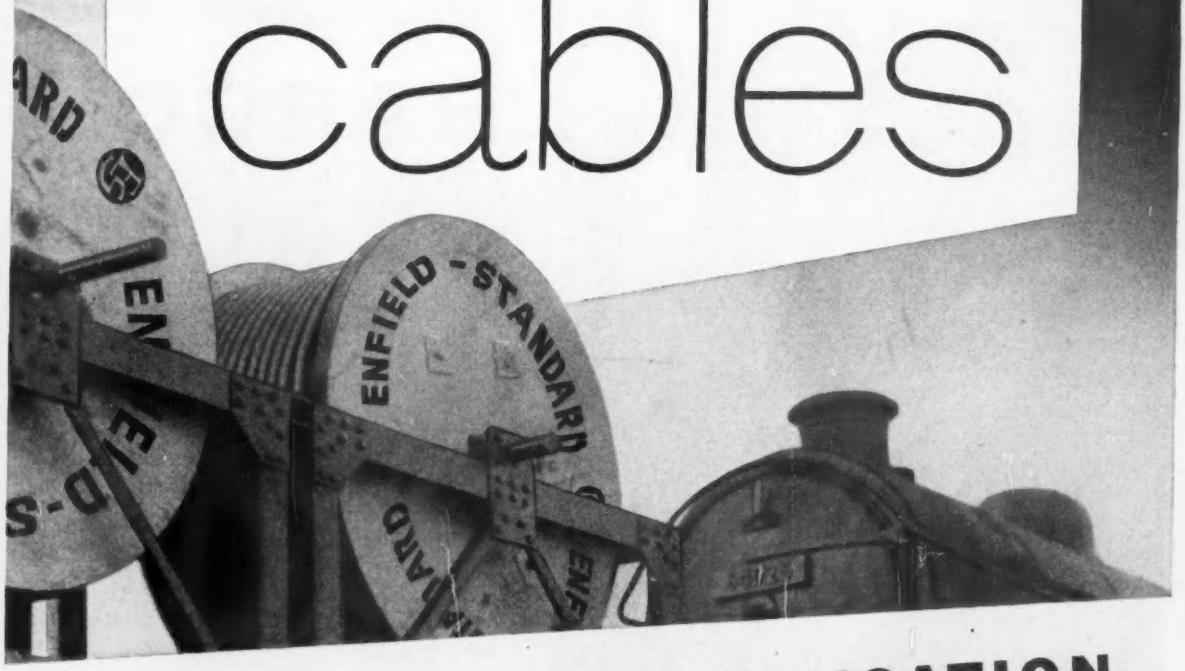

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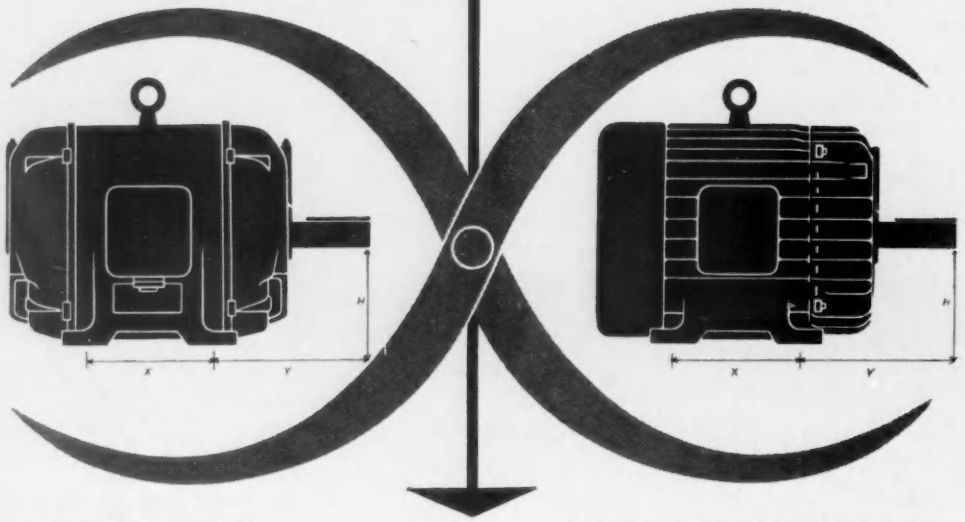

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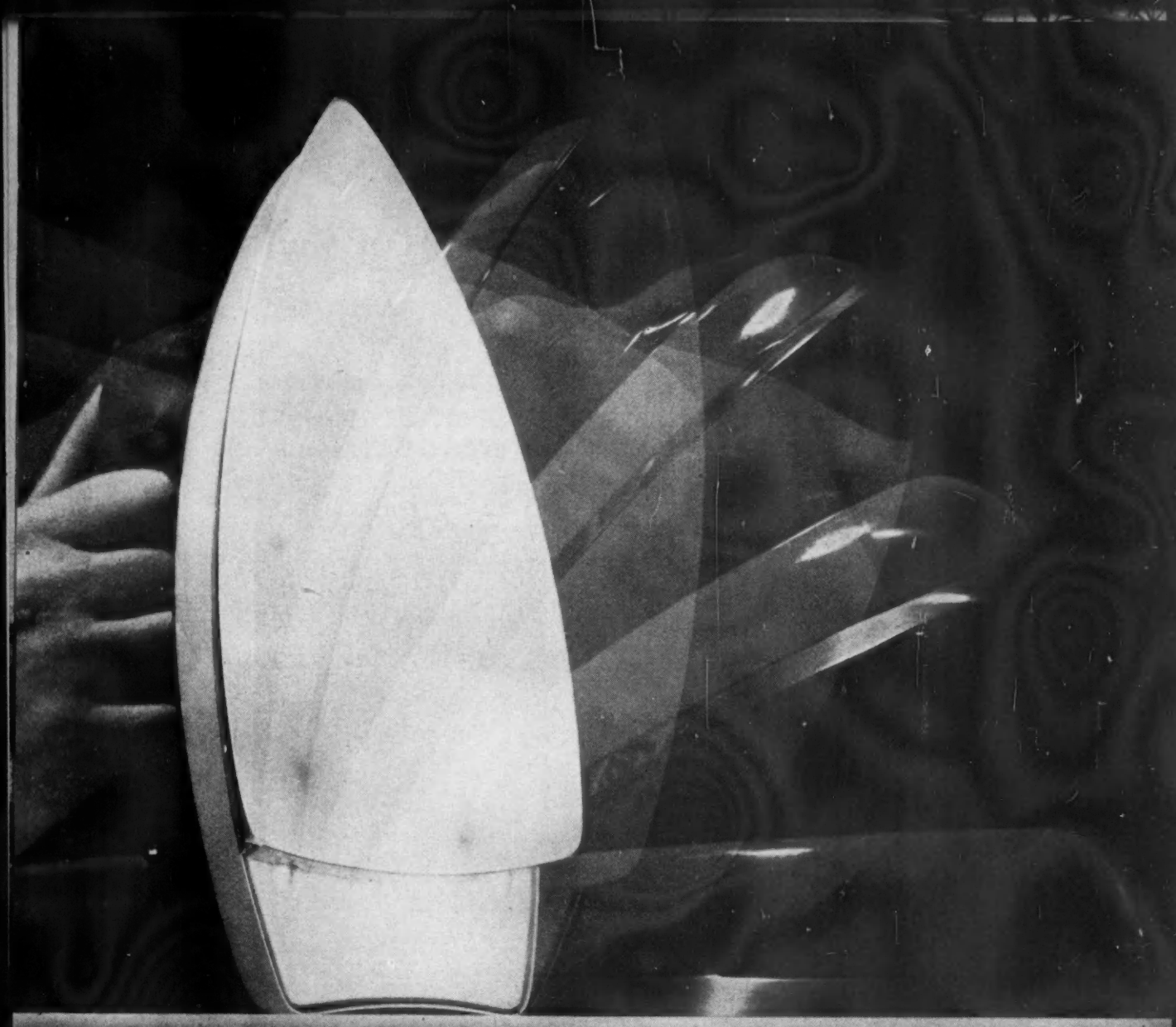

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(a young wives' tale from Canada)

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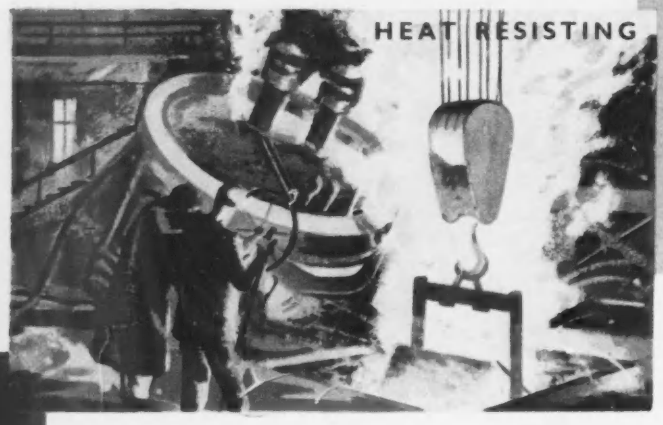

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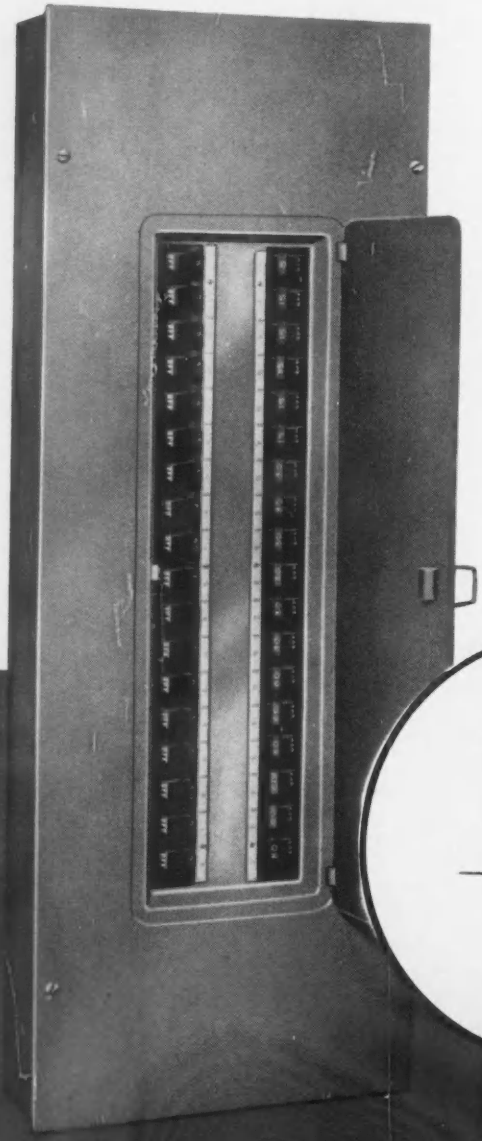

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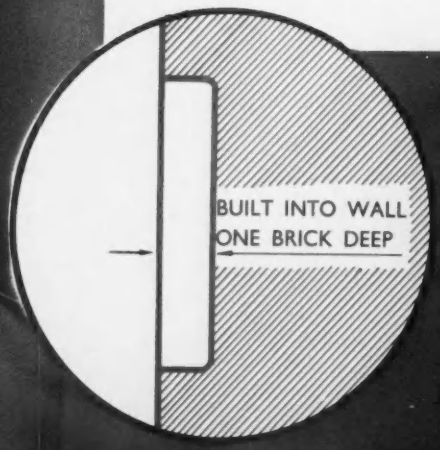

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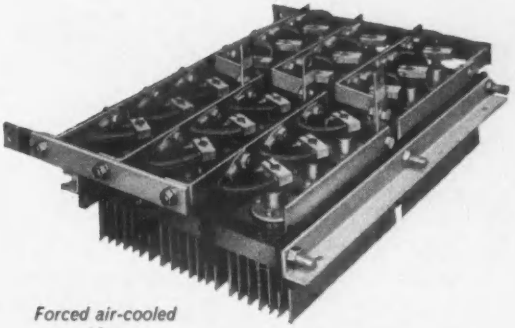
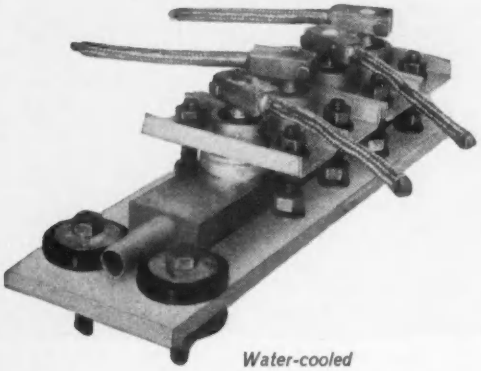
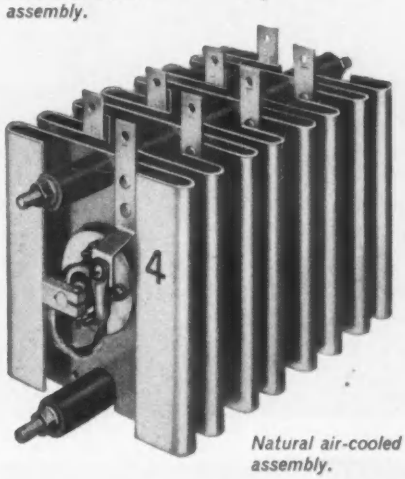


Forced air-cooled assembly.



Water-cooled assembly.



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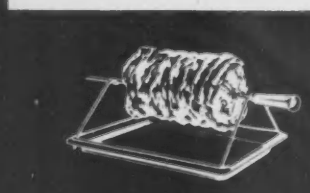

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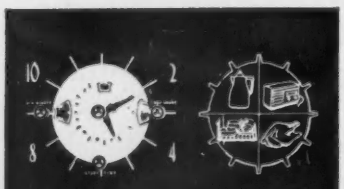

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Gives perfect time always as a normal electric clock—and permits completely automatic absentee control of *all* operations . . . oven, Rotiss-O-Mat, Many-go-Round, Therm-O-Guard and Therm-O-Fryer or Deep Well Cooker.

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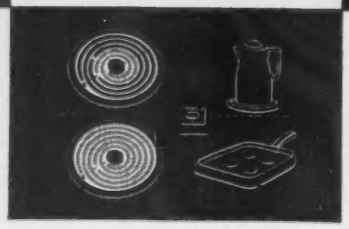

HI-LO-MATIC SHELF

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sensation!

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A complete range of models is available in 24", 30" and 40" sizes, as well as built-in ovens and surface units.

On top or in the oven . . . Fastest-ever heating in an electric cooker!

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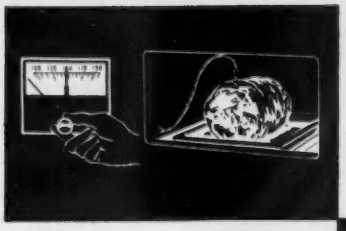

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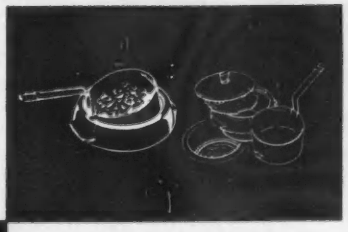

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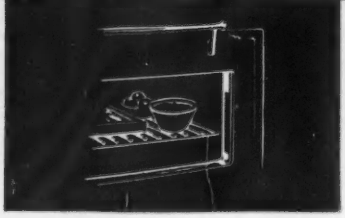

▲ DEEP WELL COOKER
The multi-purpose deep well cooker can be used for boiling, steaming, baking, frying . . . all temperature-controlled, all fully automatic—thanks to Therm-O-Guard. The deep fat fryer sinks into the cooker top—completely safe and spillproof!

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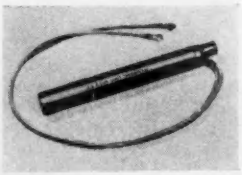

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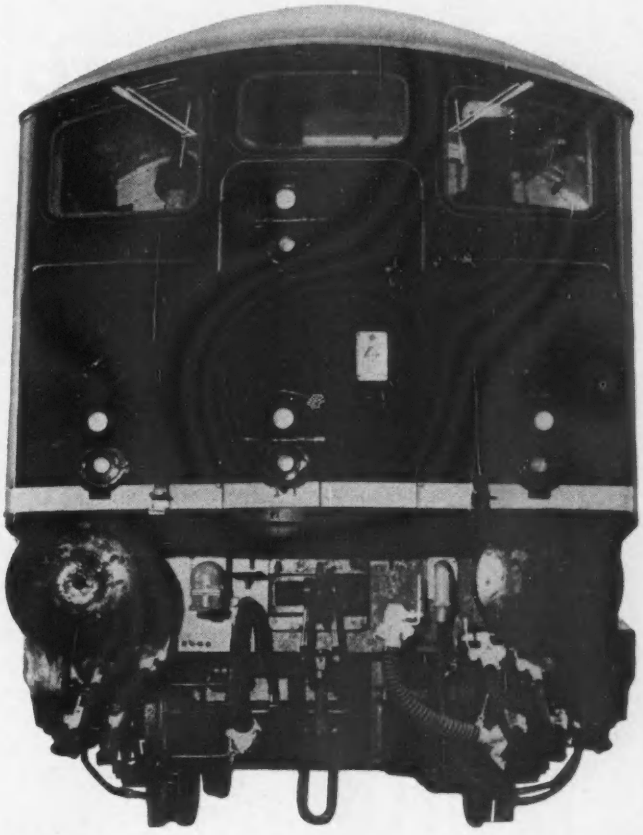

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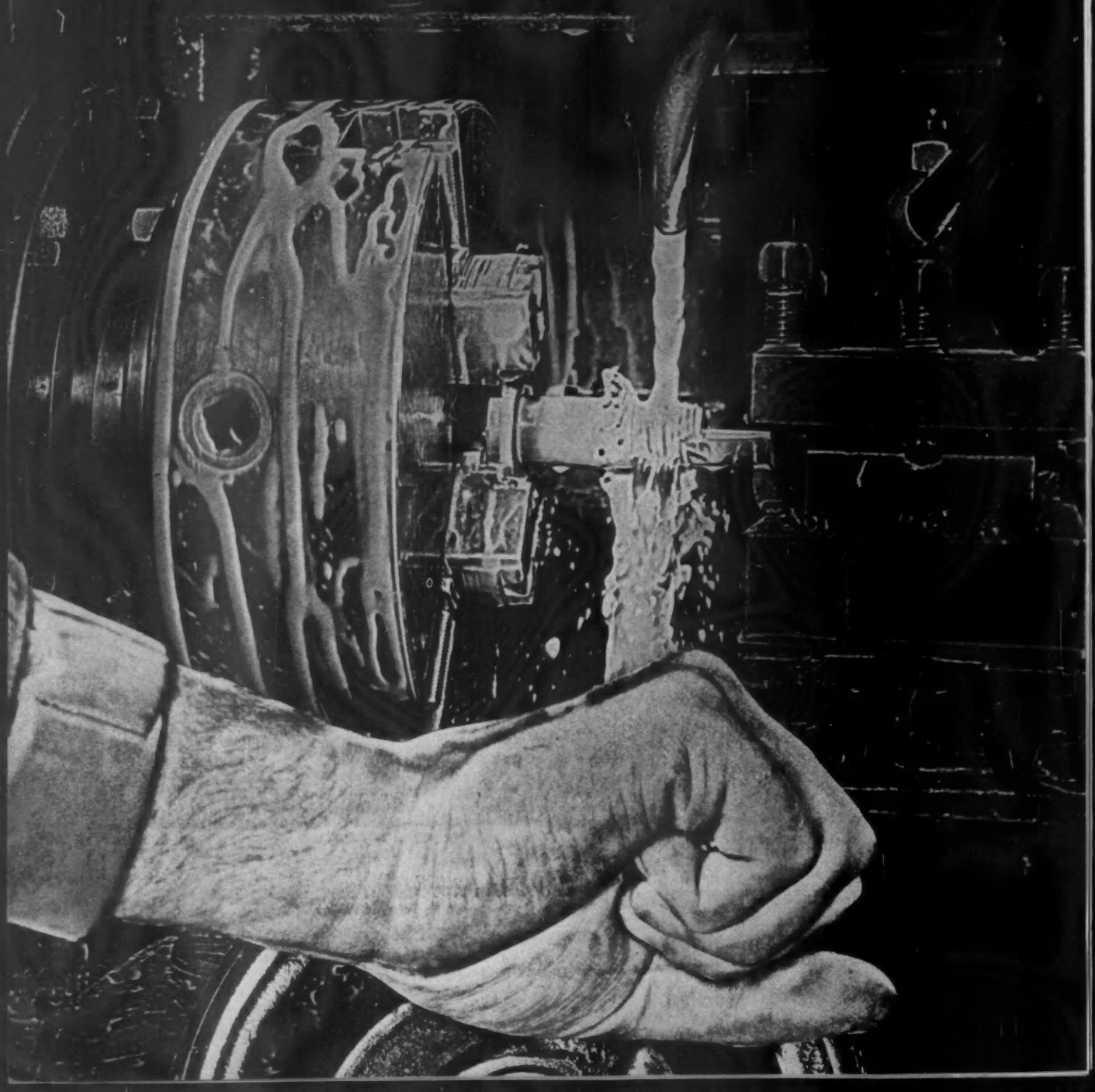
Greater safety for hands



With new Shell Dromus Oils

Most modern soluble cutting oils contain phenolic compounds used as coupling agents between the oil and the emulsifier, for better blending and easier mixing. These phenolic compounds can cause skin irritation, especially where modern high-speed machines are used and the emulsion can concentrate, through the evaporation of water, above the safety level.

Shell research chemists have been working on this problem, which has been causing some concern to Management. After considerable research, Shell Dromus Oils have been reformulated and these new cutting oils now produce bland emulsions, which considerably reduce the risk of skin trouble to operators.

The real difficulty was to find a new coupling agent to replace the phenolic compounds, and Shell finally used what their chemists know as a higher fatty alcohol complex. This solved one problem, but presented another. The new coupling agent was volatile at the high temperatures normally used in blending processes. Further research found a solution to this problem by designing and installing new plant.

The new Dromus Oils are every bit as efficient as before and cost no more. They put Management in the welcome position of being able to minimise working hazards at no extra cost. And machine men need no longer be so worried about skin troubles.

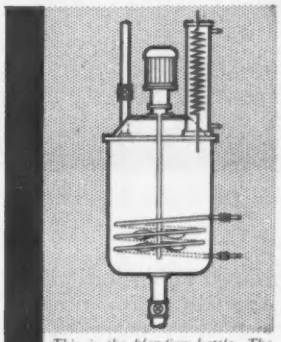
The moral of the story is that Shell research is supremely applicational. The centre at Thornton is always ready to work with even the most specialised sectors of industry to produce the right oil for the job. If you and your organization have any major lubricating problems, it pays to get in touch with your local supplier of Shell Industrial Lubricants.

The Research Story

Shell chemists in the U.K., in Holland and in the U.S.A., prepared and examined hundreds of experimental soluble oils, and established that certain combinations of fatty alcohols could be used in place of phenolic compounds with no loss of efficiency. They set to work to discover the best combination and developed a higher fatty alcohol complex which fitted exactly. Then they realised that to blend this new coupling agent into soluble oils would require special plant and new blending techniques.

Exhaustive testing of blend stability, emulsion stability, anti-corrosion and machining properties led to selection of the most promising blends. A pilot plant was set up to produce batches of these for use in field trials.

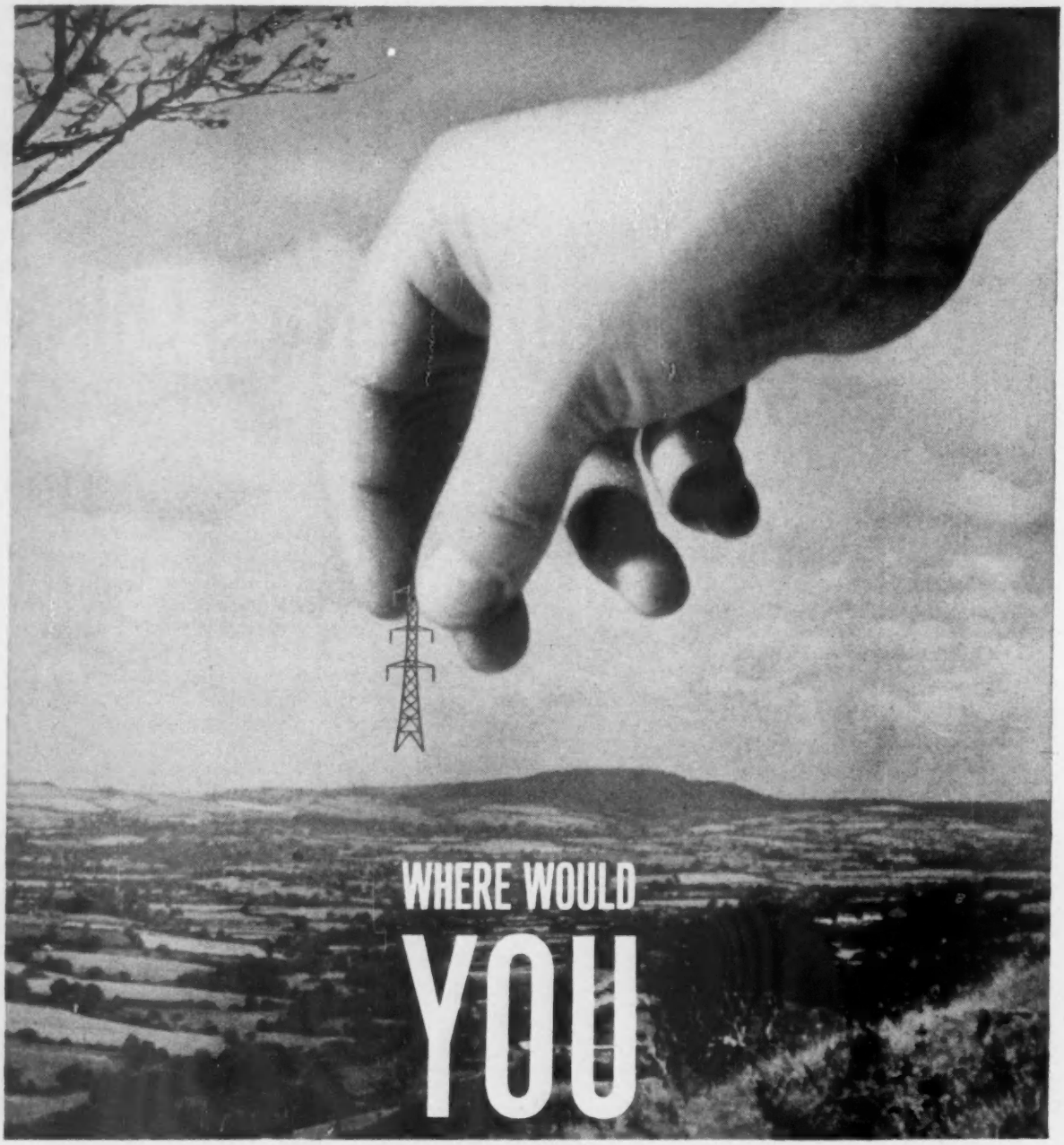
This field testing and final development proceeded for two years whilst production plants were erected at points so chosen as to give the most economical and rapid delivery throughout the United Kingdom.



This is the blending kettle. The reflux condenser beside the stirrer motor prevents the loss of constituents volatile at the blending temperature.

NEW SHELL DROMUS SOLUBLE CUTTING OILS

another proof of Shell leadership in lubrication



RUN THE PYLONS?

They still live by lamp-light up in the hills. Soon, a new transmission line will thread its way along the valley, bringing the people up on the hill the electricity they've been wanting.

Pylons down here will mean a better life up there. But how will the people of the valley feel about the pylons? And the people who visit the valley?

The Central Electricity Generating Board are just as concerned about this as they are about bringing in the power. For the nation has charged the Board with a double duty. Not only to maintain an efficient, economical electricity supply, but also to preserve the amenities of the country as they go.

Often, these duties conflict. Again and again problems arise which seem impossible to solve. But always, they seek to achieve a balance. A balance between the need to answer demands for more power and the need to preserve the beauty, the intangible values, of a landscape, a village, the still unspoilt approaches to a town.

■ These advertisements are appearing in the farming and country magazines. The Central Electricity Generating Board thank contractors for their co-operation in the past, and know that they will do all they can, while engaged on work for the Board, to preserve amenities.

THE CENTRAL ELECTRICITY GENERATING BOARD

CEGB

NEWS SHEET

Two area boards increase domestic and commercial tariffs; South Wales by 10%; South East by about 5%. Chairmen of other boards give warning of higher prices in near future. Eire ES Board also raise tariffs to give 5% more revenue after deficits for three years running, largely due to rural electrification costs. (505, 533)

Green-yellow for earthing core is new international colour code for flexibles, agreed by 15 countries, including UK, at CEE London meeting. Other cores to be blue and black in other countries, but not in UK. (506, 533)

Capital financing of supply industry analysed in further review of annual reports of Electricity Council and CEGB; surplus provides only 8·8% of requirements. Importance of contribution from service centre retailing emphasised. (505, 514)

Engineering developments of area boards put emphasis on improving supply, from continuity and voltage regulation aspects. Research concerned with plastics cables, effects of arc furnace loads, transformer noise and load characteristics. Commercial interest in off-peak development and meter reading economics. (516)

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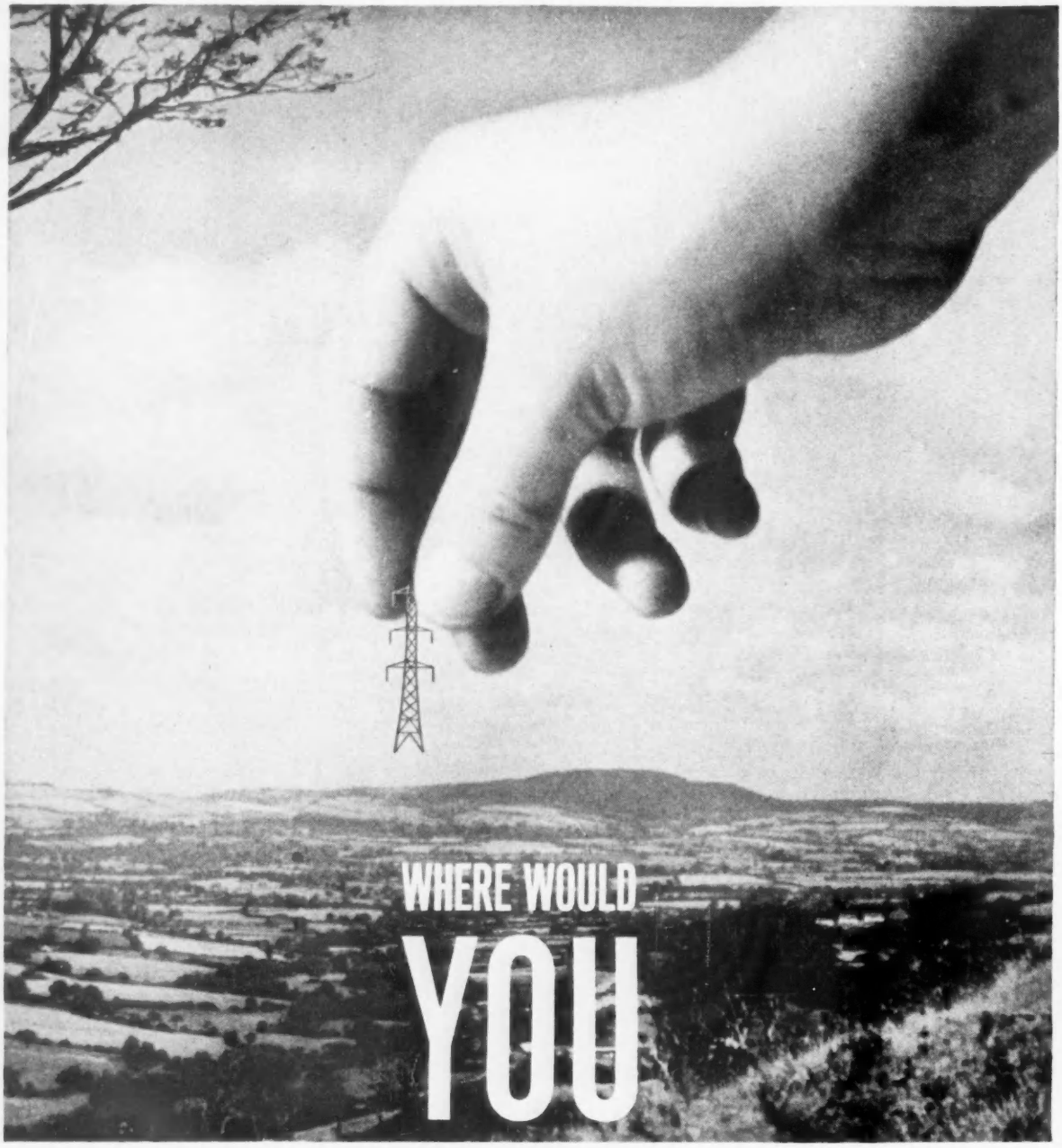

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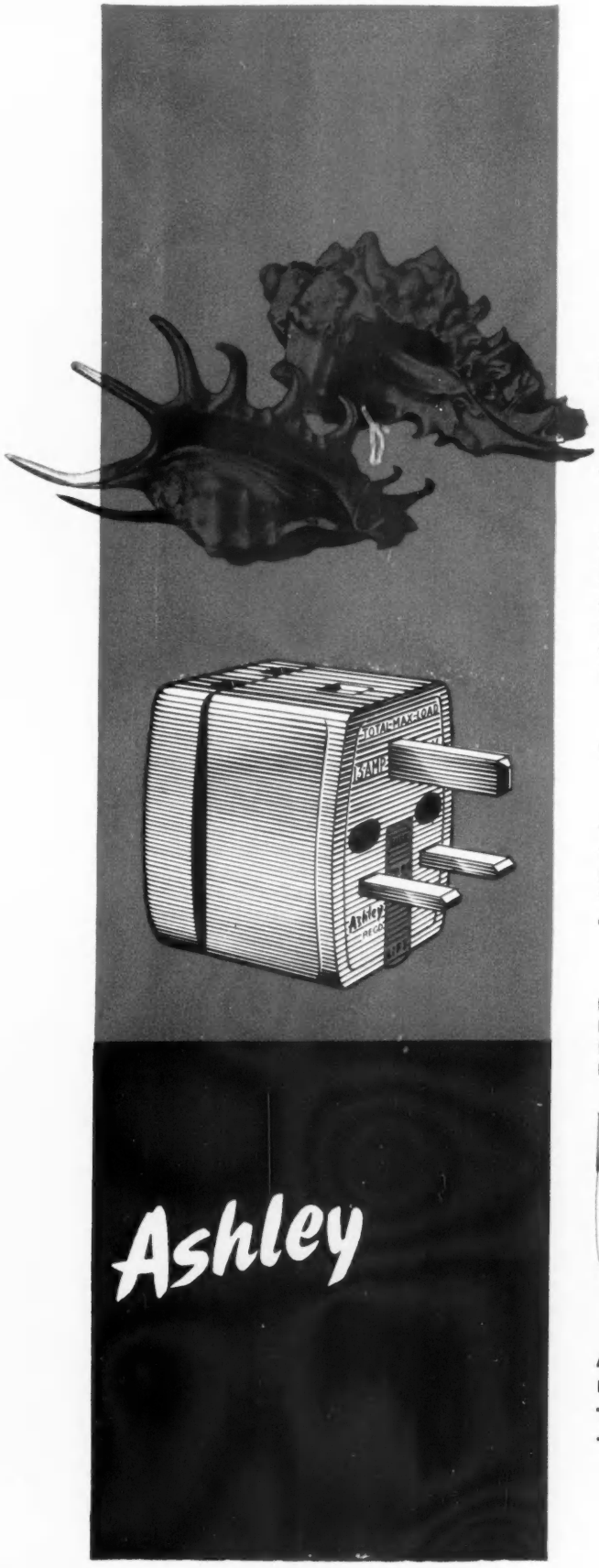

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Twin Safety Shuttered Outlets to receive two "Ashley" or other make BS 1363, 13 amp. Fused Plugs. Available either fused, with a "push out" holder for easy fuse replacement or unfused.

MPF 25	With 13 amp. Fuse-link	Brown	81/- doz. list
MPF 26	With 13 amp. Fuse-link	Cream	87/- doz. list
MPU 35	Unfused	Brown	72/- doz. list
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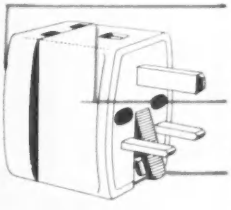

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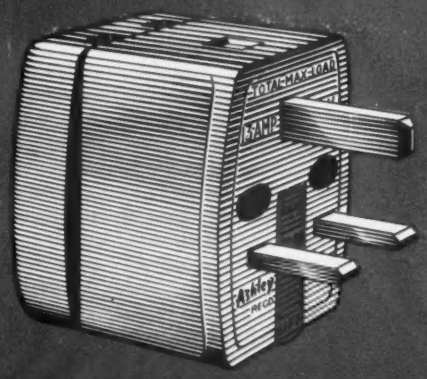

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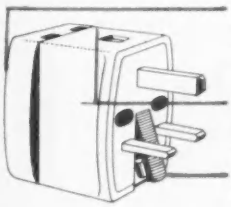

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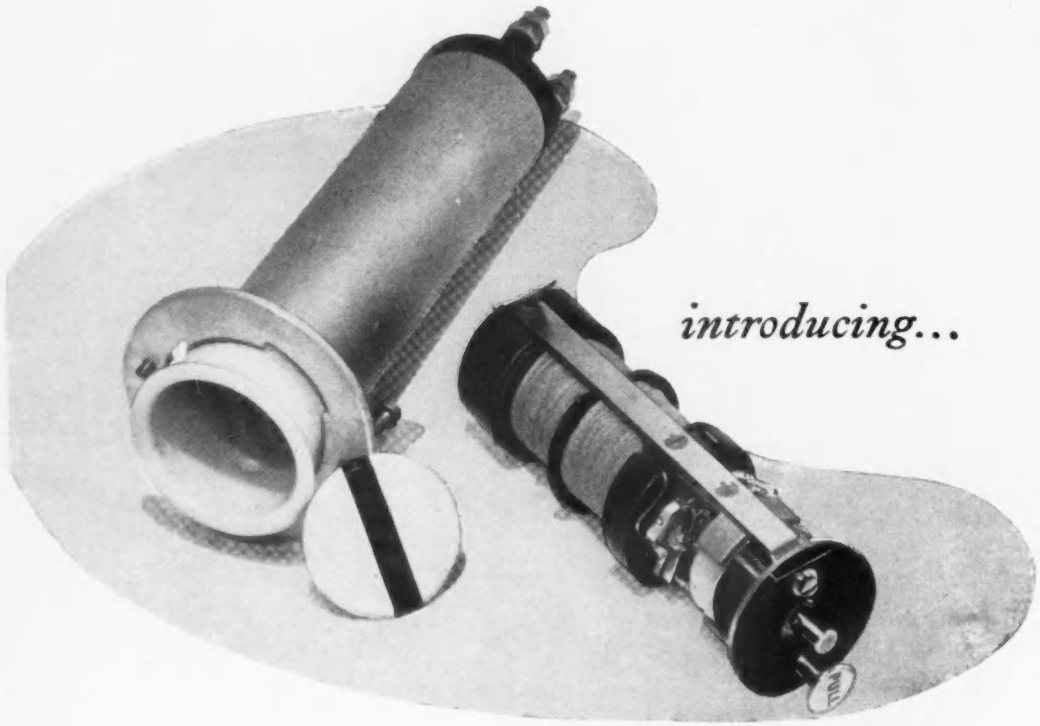

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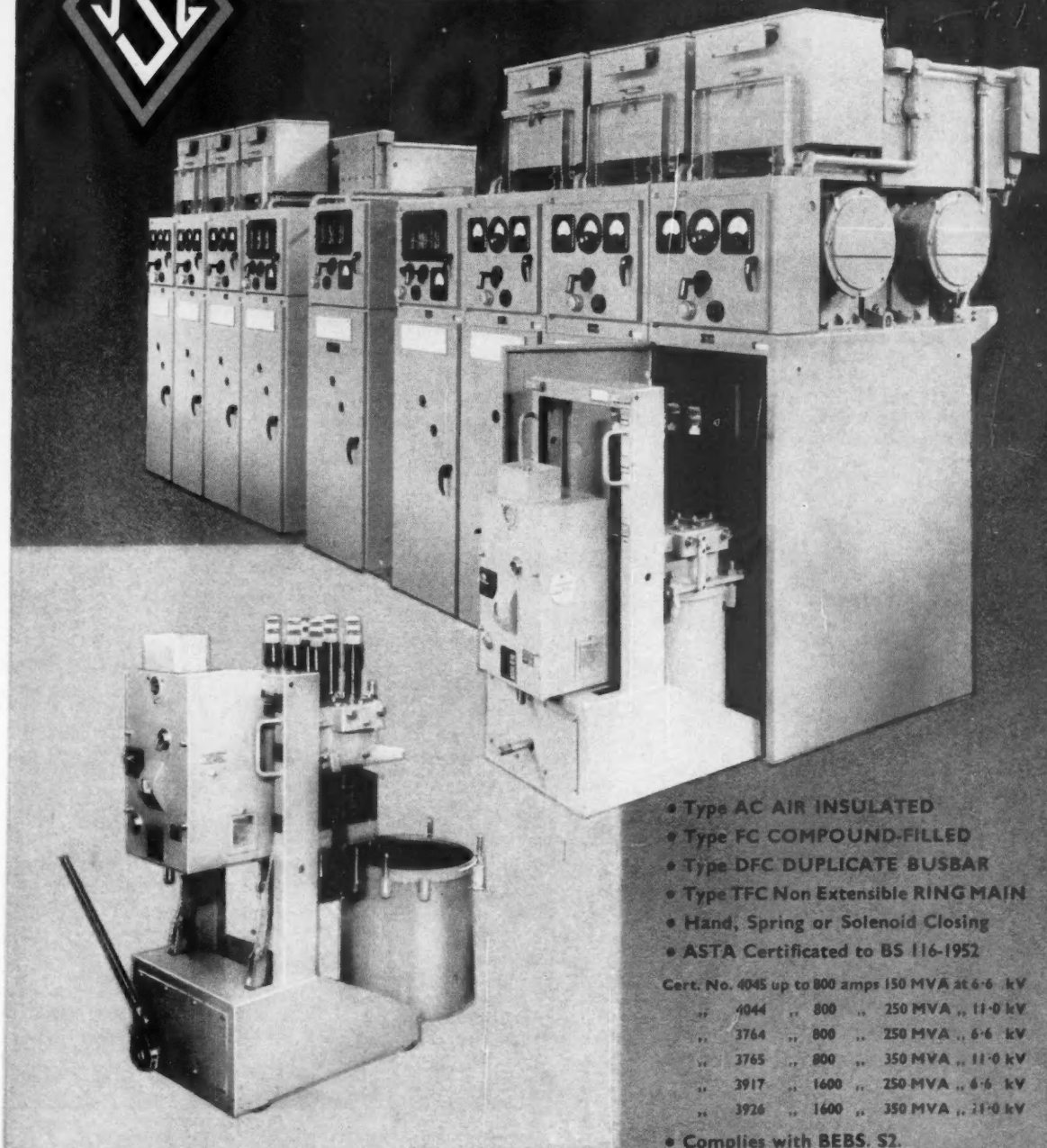

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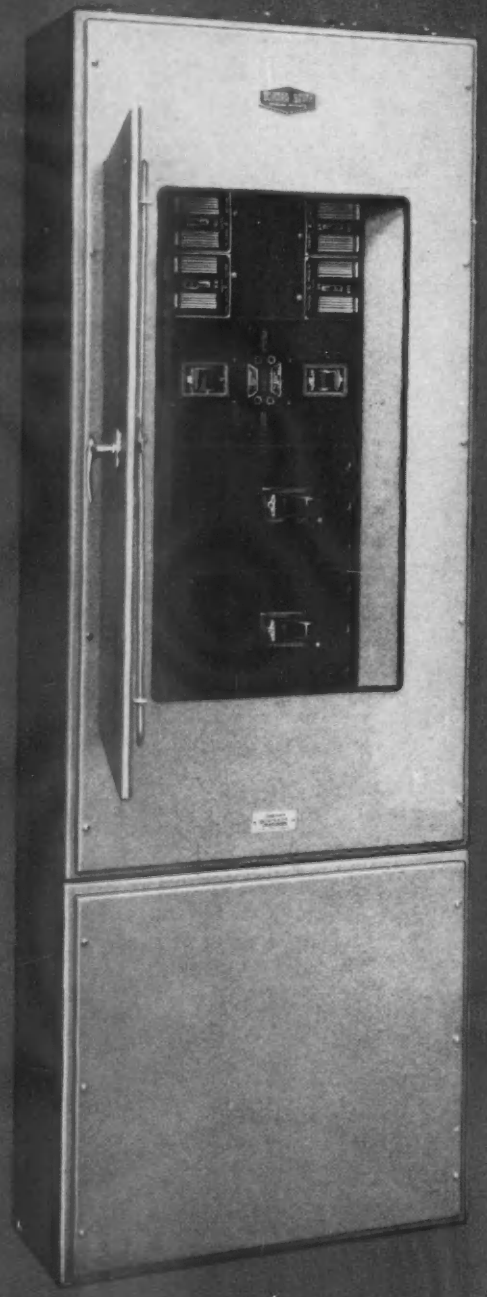

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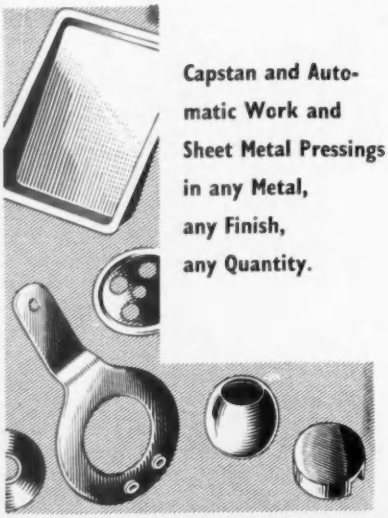

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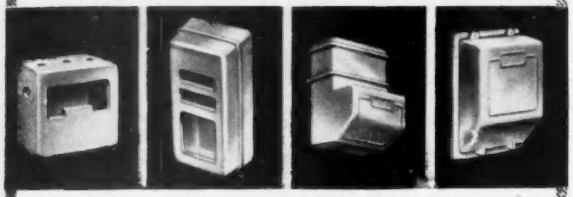

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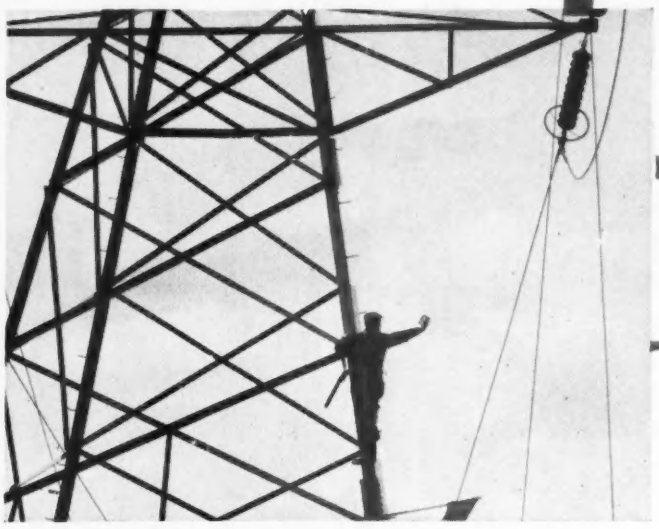
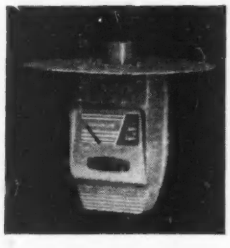


The illustration above shows the "METRAC" in use when checking one circuit of a double circuit 132 kV overhead line prior to earthing. (Photo by courtesy of Central Electricity Generating Board.)

An entirely new approach to an old problem, that of live line detection to satisfy "safe to work" rules. No contact with the conductor is necessary as the "METRAC" detects the electrostatic field set up by a conductor energised by an A.C. voltage. The pointer gives a clear unambiguous indication of danger or safety against an illuminated red and green indicator plate suitably inscribed. Push button operated, small in dimension and weighing less than 2 lb, it is a one-hand instrument.
Available for overhead lines, busbars, conductors and switchgear up to 275 kV.

On the right is shown a model adapted for use at the spouts of draw-out or drop-down metalclad switchgear up to 66 kV. In this the detecting probe is extended and a shield prevents insertion beyond the mouth of the spout.



Manufactured under licence from the Central Electricity Generating Board and accepted by the National Committee for the Approval of Voltage Testing Devices. Is the subject of patent applications both in Great Britain and abroad.

* *This new instrument is fully described in Catalogue Sheet 255B. Please write for your copy.*

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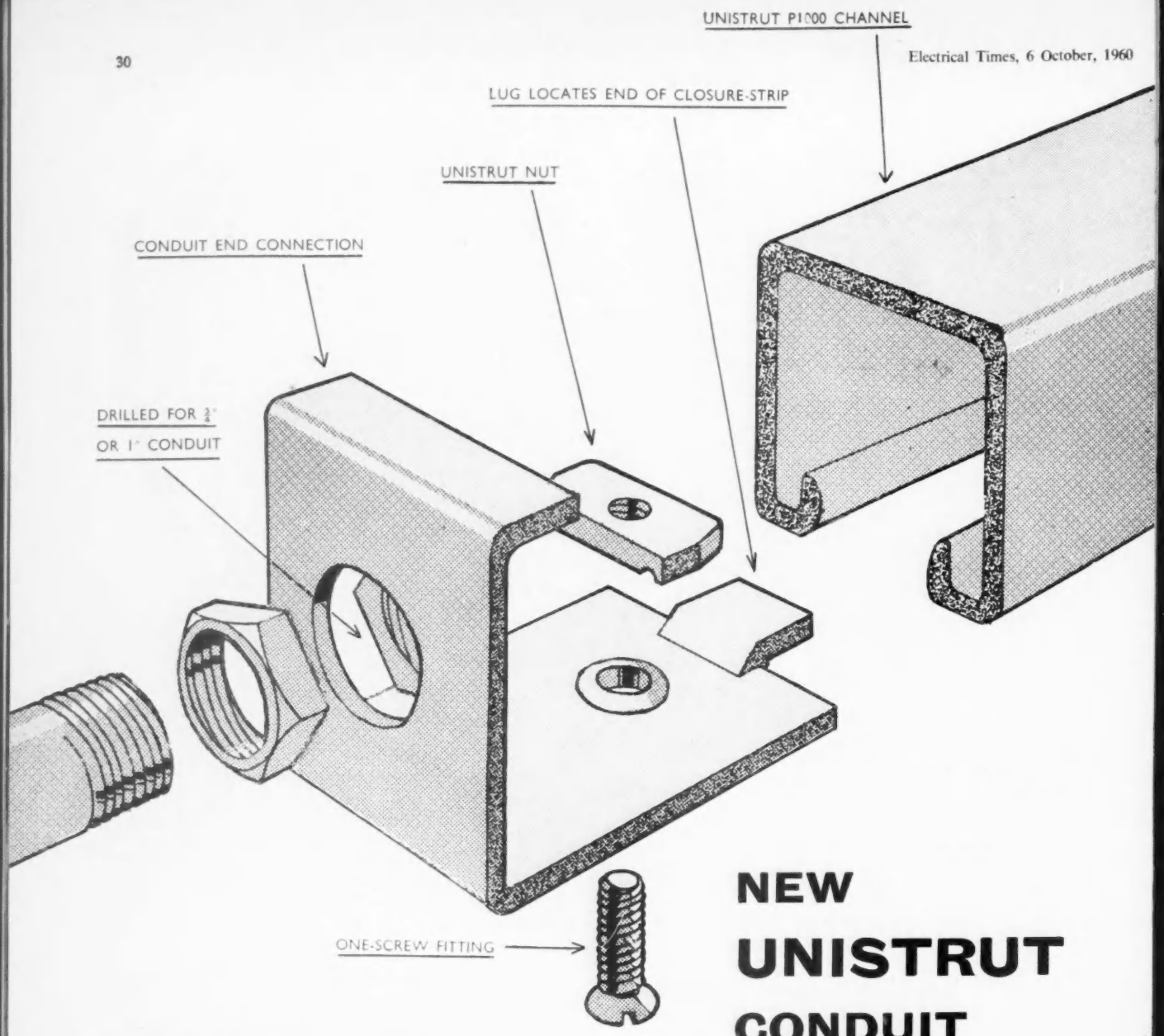


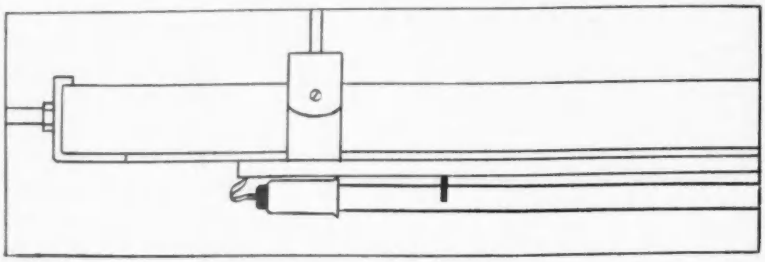
NEW UNISTRUT CONDUIT END CONNECTIONS

SPEEDS FLUORESCENT INSTALLATION

This new component neatly and quickly effects the change-over from conduit to Unistrut channel where the latter is used as fluorescent lighting trunking. It is secured by a single screw to a self-locating nut in the channel, and is supplied ready drilled for either 1" or ¾" conduit.

The connection may be used either where the individual fluorescent fittings are secured direct to the Unistrut channel, or where the channel is clamped to high roof-beams, etc. with the individual fittings on droppers. In either case, wiring accommodated in the channel is neatly concealed by a snap-in closer strip.

The Unistrut conduit end connection is available in Unistrut green stove enamel finish or electro-plated. Please write for drawings to include in your Unistrut Parts Catalogue.



For information on the Unistrut system in fluorescent lighting trunking and other electrical applications, please write to:–

UNISTRUT DIVISION OF SANKEY-SHELDON LTD.

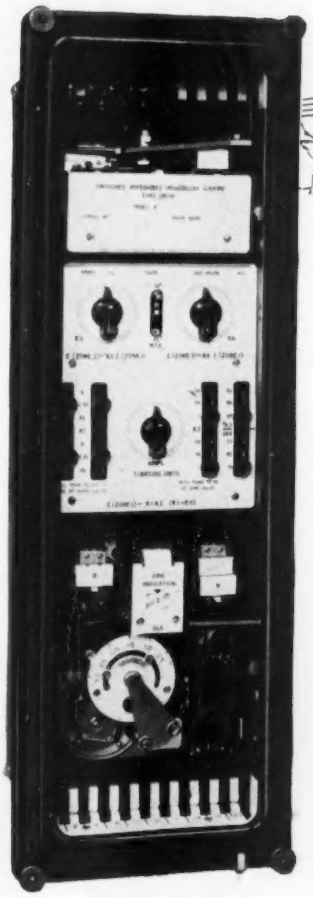
43/45 Broadwater Road, Welwyn Garden City, Herts. Tel: Welwyn Garden City 6321 (4 lines)

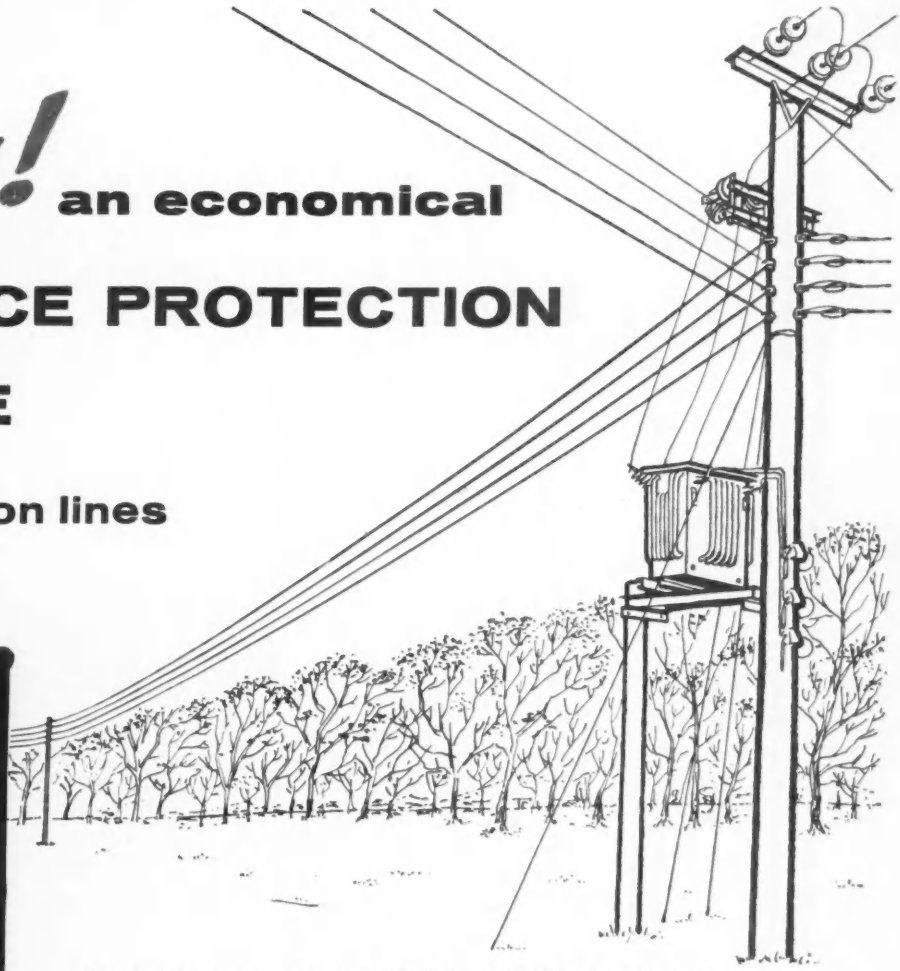
UNI 633

ST

Now! an economical DISTANCE PROTECTION SCHEME

for distribution lines





The new 'ENGLISH ELECTRIC' type SSM3V switched 'Mho' distance scheme provides phase fault protection for 11 kV or 33 kV lines at a cost very little more than inverse-time overcurrent relays. It overcomes discrimination problems and is high speed in operation.

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'ENGLISH ELECTRIC'

relays

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RL43

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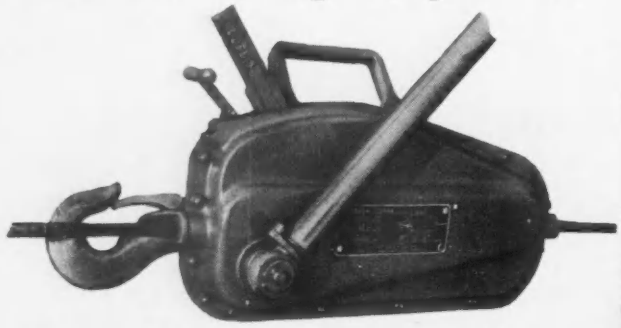
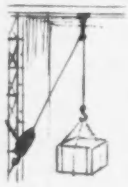
by appointment to Electricity



ANY HEIGHT OF LIFT · ANY LENGTH OF PULL



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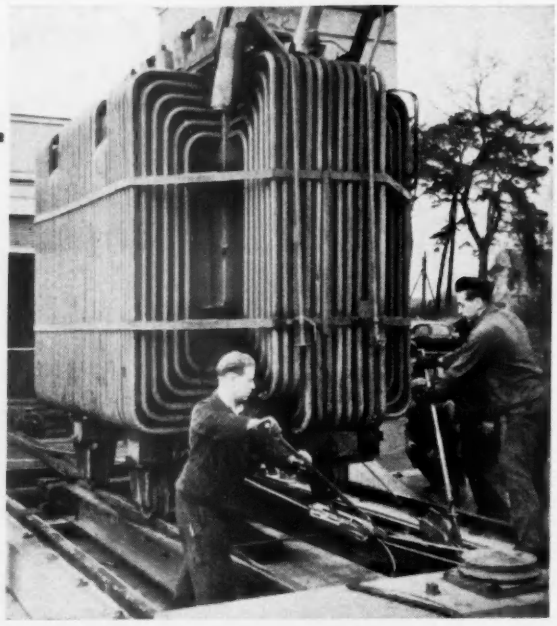

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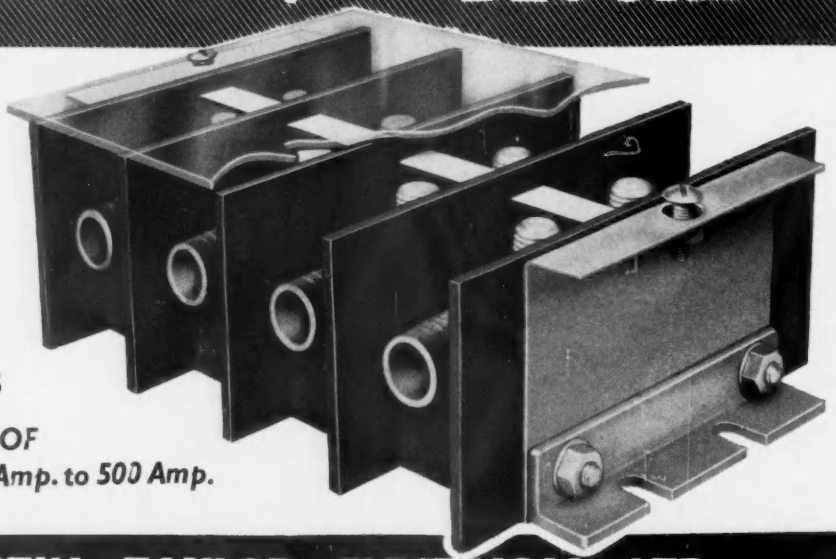

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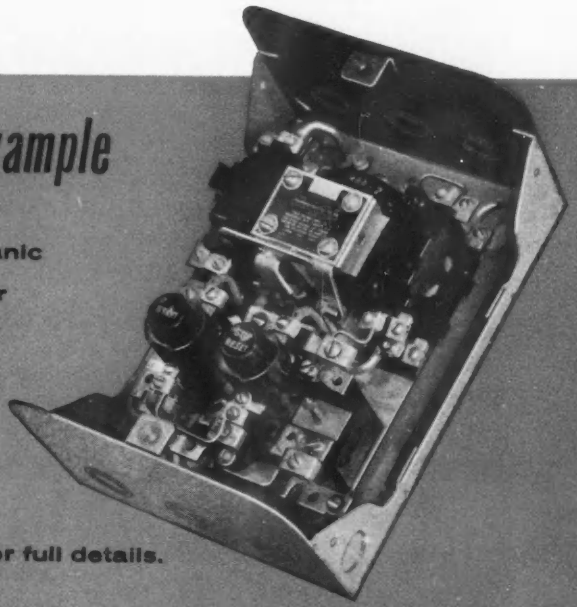
A.C. induction motors for example



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THE CONTRACTOR

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The Beta Terminal Block has been designed for the simple and economical grouping of any number of ways. Extra ways can be inserted without dismantling or further drilling. Only two fixing screws are required for up to 12 ways. Provision is made for numbering each way individually or in groups. Transparent covers are available if required.

Moulded from high grade electrical quality non-tracking phenolic material, with terminals and connecting link made from brass, electro-tinned. While conforming to highest electrical and mechanical standards, the size has been reduced to a minimum.

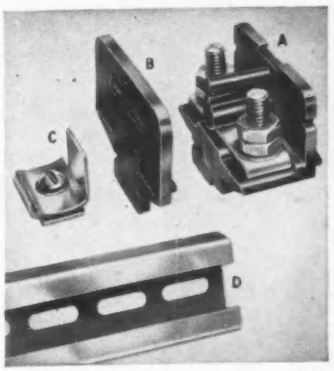
BASIC UNITS

A Body with connecting link and studs.

B Moulded barrier. Required only at one end of group.

C Steel end clamp, one required at each end of group.

D Cadmium plated slotted steel channel.



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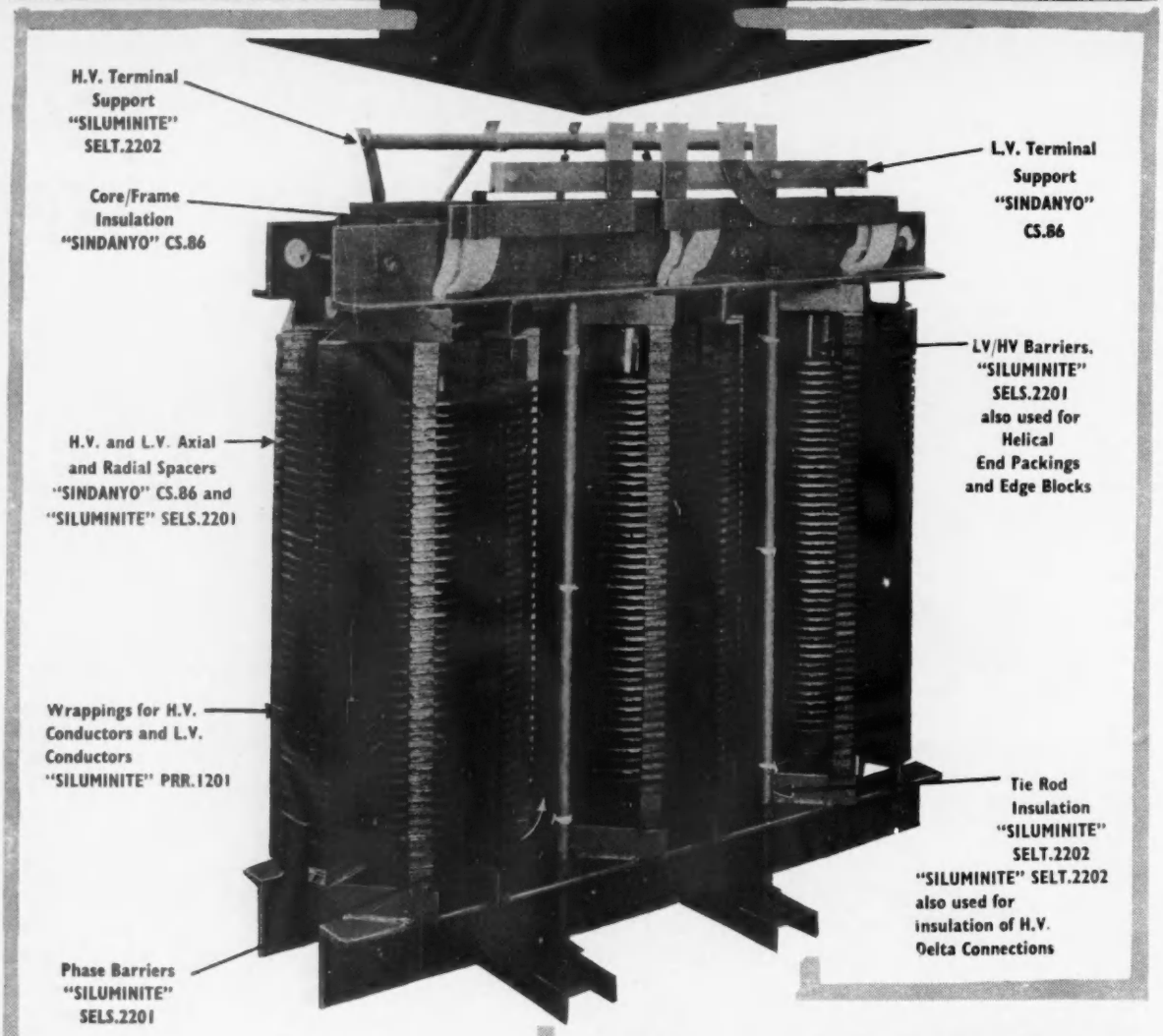
ASBESTOS for CLASS H and CLASS C INSULATION FOR DRY TYPE TRANSFORMERS and SIMILAR APPLICATIONS


H.V. Terminal Support "SILUMINITE" SELT.2202
Core/Frame Insulation "SINDANYO" CS.86
H.V. and L.V. Axial and Radial Spacers "SINDANYO" CS.86 and "SILUMINITE" SELS.2201
Wrappings for H.V. Conductors and L.V. Conductors "SILUMINITE" PRR.1201
Phase Barriers "SILUMINITE" SELS.2201
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CLASS C INSULATED TRANSFORMER 500-kVA 3 PHASE 11,000/433V

Manufactured by Associated Electrical Industries Ltd., using:- Asbestos based insulating materials supplied by Turners Asbestos Cement Co. Ltd.
(By courtesy of Associated Electrical Industries Ltd.)

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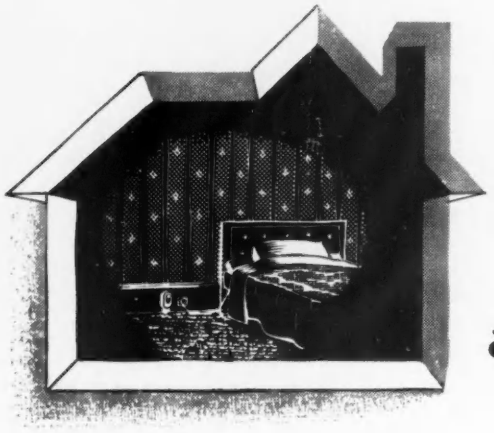
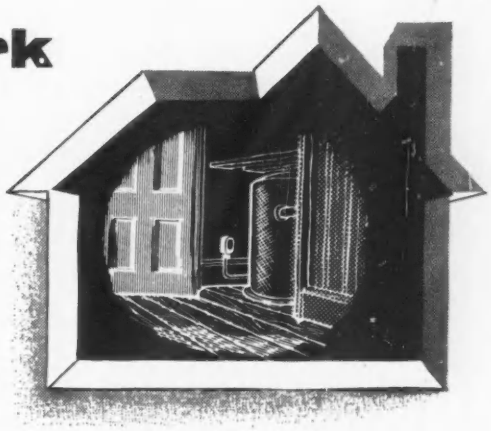
Birmingham Office: Union Chambers, 63 TEMPLE ROW. *Telephone:* MIDland 0244

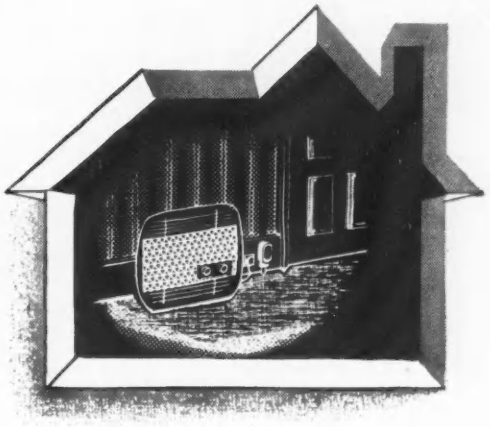
S29

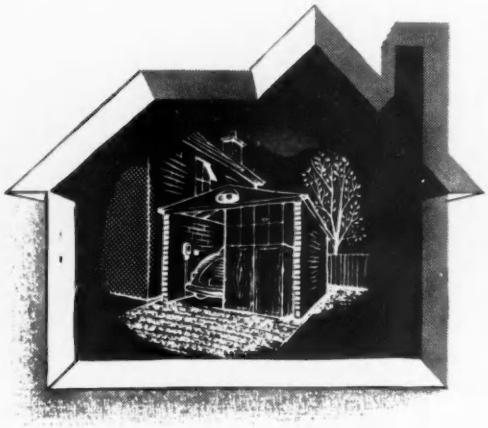
Put VENNER to work about the house



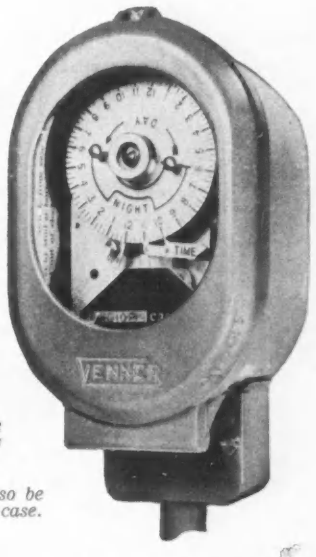


The average home today relies more and more on electrical equipment which can prove expensive if it is not properly controlled . . . immersion and under floor heating, for example. The Time Switch type MD1QP illustrated can switch an immersion heater off at night as well as on again in the morning while the family are still sleeping, saving power overnight but still providing hot water when it is needed. It can also control an electric blanket, porch or drive lighting, or a wireless set used as an early morning alarm.





Once set, the Time Switch needs no attention. The clock is electrically actuated; an external switch allows the appliance which it controls to be turned off when it is not needed. There are many variations of the Venner Time Switch, all described in our No. 1 series of leaflets, free on request.



A cable cover is available for conduit wiring. Rating 20 amps. 200/250v. A.C.

The Time Switch can also be supplied in an all-plastic case.

Venner Limited, Kingston By-Pass, New Malden, Surrey.
Telephone: MALden 2442

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A body needs muscles to control movement in very much the same way as a mechanism needs springs. These vital links take the stress and strain of every day rigorous use — nature provides the muscles . . . SALTER provides the springs. Two centuries of experience and development in the manufacture of springs of every type have enabled us to keep ahead of the ever-changing requirements of industry.

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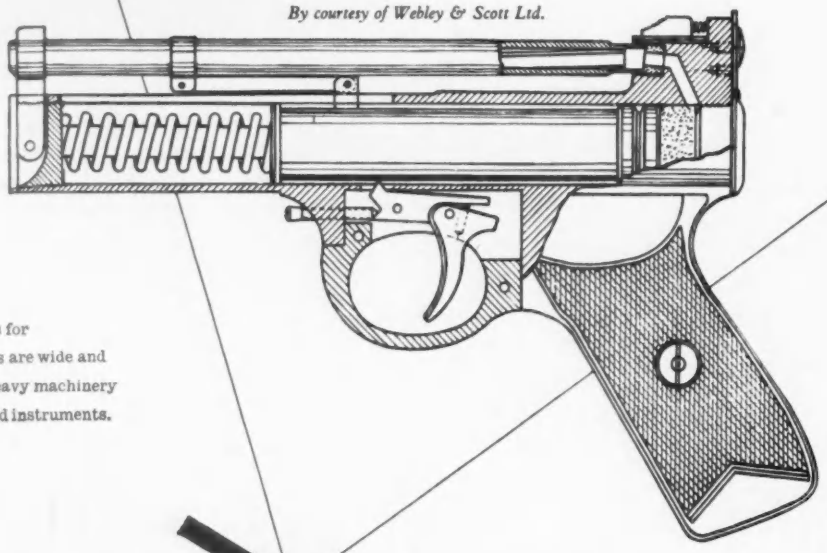

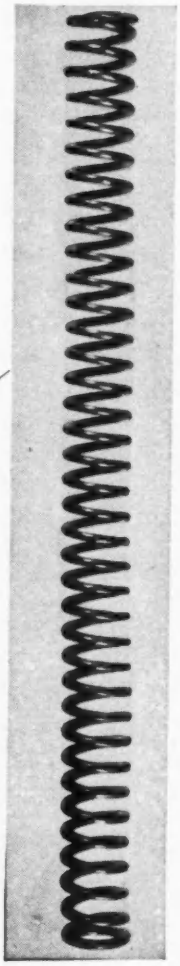

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WEST BROMWICH

ENGLAND

THURSDAY 6 OCTOBER, 1960

Registered as a Newspaper Volume 138 No. 14

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2

Telegrams: Equivolt . Estrand Telephone: HOLborn 6016

Dans ce numéro

Traction Ferrovicire 25kV, 50 cycles par seconde ... 507

On estime que les nouveaux plans d'électrification des Chemins de Fer Britanniques exigeront 200 MW du système public de distribution, à un facteur de charge variant entre 0,67 pour les lignes les plus chargées et 0,26 pour les moins chargées. On estime la consommation annuelle à 950 millions de kWh environ. L'énergie proviendra du système de transport national, par l'intermédiaire de sous-stations équipées de transformateurs Scott ou monophasés de 132/25 kV. Toutes les commutations de prises et autres opérations de commutation seront télécommandées par un système à fréquence vocale à partir des salles de commande. Tout l'appareillage de commutation est protégé et utilise des disjoncteurs à bain d'huile pour l'alimentation de la traction.

Techniques de la Distribution 516

Les rapports annuels des organismes nationalisés qui distribuent et vendent l'électricité au détail en Angleterre et au Pays de Galles font apparaître une utilisation croissante des disjoncteurs à réenclenchement rapide pour améliorer la continuité de l'alimentation. L'intérêt manifesté pour le chauffage par le plancher, alimenté aux heures creuses, s'est maintenu. Les conducteurs en aluminium pour câbles ont été largement utilisés et on a procédé à des essais sur les isolants plastiques pour câbles secteurs. La difficulté que présente le problème de l'emplacement des sous-stations a fait croître l'intérêt pour les transformateurs enterrés dont le radiateur de refroidissement seulement se trouve à l'air libre.

Des Ingénieurs Canadiens visitent l'URSS 528

Des ingénieurs canadiens qui sont allés en URSS pour visiter des installations d'alimentation jugent cet équipement "remarkable" dans le domaine de la transmission à très haute fréquence et de la génération hydroélectrique.

In dieser Nummer

Fahrbetrieb im 25 kV, 50 Hz-Netz 507

Neue Elektrifizierungsvorhaben der britischen Eisenbahnen werden schätzungsweise insgesamt eine Leistungsforderung in der Höhe von etwa 200 MW an das öffentliche Versorgungssystem stellen, bei einem Belastungskoeffizienten, der zwischen 0,67 für die am schwersten und 0,26 für die am leichtesten belasteten Leitungen schwankt. Die jährliche Leistungsaufnahme wird auf etwa 950 Millionen kWh geschätzt. Die Leistungszufuhr erfolgt aus dem Verbundnetz durch Unterwerke, die mit einphasigen oder in Scottscher Schaltung angeordneten Transformatoren ausgerüstet sind. Sämtliche Stufenschaltungen und sonstige Schaltvorgänge werden von Kontrollräumen aus, mittels Tonfrequenzsystem ferngesteuert sein. Sämtliche Schaltgeräte werden in geschlossener Bauart ausgeführt. Für die Fahrstromleitungen werden Oelabschalter verwendet.

Stromverteilungsfragen 516

Die Jahresberichte der staatlichen Stromversorgungsbehörden für England und Wales lassen die zunehmende Verwendung schnellwirkender wiedereinschaltender Ausschalter erkennen u. zw. im Interesse erhöhter Belastungsstetigkeit. Beträchtliches Interesse wird weiterhin elektrischen, mit Ausfallstrom betriebenen Fussbodenheizungen entgegengebracht. Aluminiumseelen sind im Kabelbau weitgehend verwendet worden und die Brauchbarkeit verschiedener Kunststoffe als Netzkabelisolierung ist Gegenstand eingehender Versuche gewesen. Bei den herrschenden Schwierigkeiten in der Beschaffung geeigneter Baustellen, geht man im Unterwerksbau dazu über, die Transformatoren versenkt und nur die Kühler freistehend anzuordnen.

Besuch kanadischer Ingenieure in Russland 528

Kanadische Ingenieure, die U.d.S.S.R. besuchten um E-Werksanlagen zu besichtigen, bezeichneten als "hervorragend" das, was sie auf dem Gebiete der Ultrastarkstromübertragung sowie der Wasserkraftanlagen zu sehen bekamen.

50 c/s Power for Railways 507

Financing International Electricity 511

Safety in Industry 512

Saving London's Legs 513

Supply Critique 514

Area Board Review 516

Domestic Electrical Accidents 519

I.E.E. President, Section and Centre Chairmen ... 522

From M.C.B. to 800 A 527

Russia's Supply Programme 528

Display for Lighting Sales 532

FEATURES

Notes on Wiring *by Megohm* 520
Overseas News 521
Personalities in the Industry 524
New Literature 526
Equipment for Industry 530
For the Electrical Trade 531
News of the Week 533
Company Activities 539
Commercial Information 540

News Sheet 21
Classified Advertisements 43
Index to Advertisers 52

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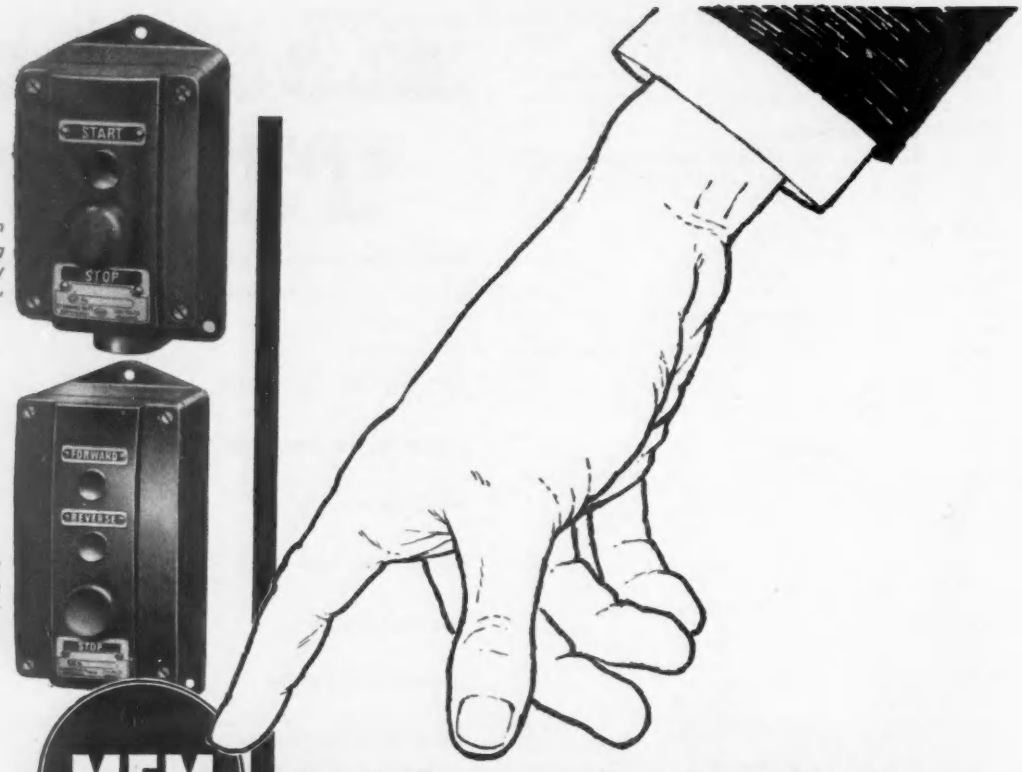

Watertight pattern surface mounting 2 CSU/W "Start"—"Stop"

Watertight pattern surface mounting 3 CSU/W "Forward"—"Reverse"—"Stop"

MEM Push Button Control Stations

Surface mounting enclosed pattern 1 CSU "Stop" only

Surface mounting enclosed pattern 1 CSU/L Push to lock "Off" Turn to release

Surface mounting enclosed pattern 2 CSU "Start"—"Stop"

Watertight pattern surface mounting 33 CSU/W "Start"—"Inch"—"Stop"

MEM Push Button Control Stations meet every requirement associated with the remote control of electric motor starters. In addition to the models illustrated, the range includes flush inset patterns for recessing into machine tools, etc., and back entry models for suspension by conduit. Forty different models are available from which to make a choice. A wide range of Control Stations is also available for use on machine tools and other equipment intended for export to Canada. These models are C.S.A. Approved and bear the C.S.A. Approvals No. 13216.

write for List No. 446 T

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MIDLAND ELECTRIC MANUFACTURING CO. LTD., REDDINGS LANE, TYSELEY, BIRMINGHAM 11

ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 6 OCTOBER, 1960

Editor and Managing Director:
ROY BALDWIN, M.I.E.E., Barrister-at-Law

Joint Editor:
K. C. POUNDS, B.Sc.(Eng.), A.C.G.I., A.M.I.E.E.

News Editor:
T. W. WRIGHT

Comment

TARIFFS ON TRIAL

After Sir Robertson King had set the backcloth by stating bluntly that electricity prices would have to go up, two area boards have followed quickly by announcing increased tariffs in the domestic and commercial classes. Other chairmen, also, have taken the opportunity of this annual period of stocktaking to give warning of impending higher prices. The two boards, however, South East and South Wales, can point to lower returns on capital employed than any other board, 0·29% and 1·18%, respectively, and most of the tariffs concerned tend to show a lower yield than the national average. But whatever may be the justification in these cases, in general, area board finance does not look unhealthy. The surplus, after paying all interest charges, rose from 2·4% in 1958-59 to 2·78% of total assets. It is the heavy additional burdens that have to be carried during the second half of the current year that have set the distress signals flying. First, there is the substantial rise in the wage and salary bill, which cannot be offset by the steadily increasing units sold per man. Then there is the rise of 5s 1d/ton in the price of coal, estimated to cost a further £11 to £12 million. This, however, has to be viewed against the 6s 3d/ton fall over the last two years in delivered coal cost due to the praiseworthy concentration of generation in short-haul stations. A greater problem for the industry is the drive towards more self financing. The undertaking to find an average of 48% of the industry's capital needs from revenue over the seven years to 1965 is proving unduly onerous. The figure has fallen from 47·4% in 1958-59 to 43·6% last year, so the industry is already nearly £15 million behind the target average. With the CEGB plant programme being revised upwards, clearly this 48% self-financing target is beginning to look unrealistic. This is a matter that needs consideration; one which, in any case, will come before Parliament next autumn, when the Electricity Council will need an increase in its borrowing powers.

DEMAND GROWTH EMERGENCY

Estimates of demand growth on the CEGB system have been persistently below realisation. This admission is one of the major revelations of the recent Generating Board report, though there is strangely little about it in the Electricity Council survey. Now the Board has decided that it must budget for a 1,200 MW larger demand in 1964 than it had previously provided for. At the 90% peak-period availability now taken for generating plant planning, that represents a sent-out capacity of 1,330 MW to be found, and of this, 650 MW is to come in extra sets in the 1964 programme, and the rest by postponing scrapping of old plant. The

question to be answered is: How much danger of failure to meet demand was occasioned by the underestimate? The figures suggest a 5% short-fall in desirable capacity without the supplementary programme, but this proportion has to be looked at with reference to its distance ahead in time. Between 300 MW and 400 MW of plant a year is being shut down in the interest of more efficient generation, so that there is a big reservoir for adjustment as each year's load experience corrects estimates for the years ahead. Also, the figure of 90% peak availability now being taken for planning purposes is, on recent experience, conservative, and so builds in additional safety factors. Thus, the additional generation required could probably have been found anyway, though without leaving much in hand for unforeseen contingencies. That the plant programme can be increased quickly in the way planned is a sign of one welcome easement—lag between planning and commissioning has been cut sharply from what it was a few years ago.

ISOLATORS OBSOLESCENT?

By definition, an isolator has negligible breaking capacity and making capacity, although it should be able to cope with high through-currents. In the latest of the annual reviews of the electrical factory inspectorate there is attention to the danger implicit in such operating characteristics in both supply networks and in factory installations. Isolators are properly opened to provide safety while working on equipment, after controlling circuit-breakers have de-energised it; but they are liable to be the chosen means of reclosing a circuit when the work is finished, especially when the isolator is near and the circuit-breaker a long way distant. Accidents due to this cause, when the circuit has, in fact, been closed on to a fault, occur from time to time and are clearly causing concern. In factory installations, the isolator is often associated with a single item of equipment, a starter or a fuse board, but somewhat similar considerations apply. The ideal answer is to regard isolators as obsolescent and fit instead isolating switches having adequate making capacity. However, there are snags about this, partly financial and partly design—the medium-voltage switch, especially, may be large relative to the simple isolator. If too much emphasis is put on the point, the situation can be reached where the number of isolators was reduced, and safety would be likely to suffer in that way. Perhaps in supply networks the case for isolating switches with a fault-making capacity is strong enough; in factory distribution the argument against the simple isolator is less convincing, though undoubtedly deserving attention.

THE RAILWAY AS A LOAD

Development of the 50 c/s, 25 kV main line electrification system, which this week is receiving close international attention at the BTC conference, is another tribute to the versatility of the grid. Fundamental to the whole concept is availability of supply points for power infeed every 25 to 30 miles, reasonably close to the track, giving high supply security, and sufficiently closely coupled with the overall transmission system to diminish by swamping the potentially troublesome effects arising from single-phase rectified train loads. The tightly linked 132 kV grid meets these requirements so well that, in most cases, it is thought unnecessary to take any special precautions about harmonics due to rectification (other than providing a delta winding to suppress third harmonics) or against the unbalance introduced by concentrated single-phase loads. Where main lines are supplied from 132 kV substations, no complex transformer connections are adopted, just simple connection of single-phase units, with adjoining sections supplied from different phases to limit unbalance. But there is another side to this. Such simplicity follows in part because the railway load is only small compared with general system load, not the immense demand that casual talk of its desirability to the supply system has sometimes made it. The Euston-Manchester-Liverpool electrification will impose a maximum demand of about 110 MW and take 640 million kWh annually at a load factor of about 65%; suburban and branch lines are less attractive from the load factor aspect. Even when fully developed, the railway load is unlikely to exceed 3% of overall system demand. The attraction of rail electrification for manufacturing industry is a matter of considerably greater moment.

GREEN-YELLOW EARTHING AHEAD

A year ago the significance of international standards made an impact on the general public through the danger from imported appliances with flexibles which followed certain continental standards with red as the earthing core. The CEE has had this question of standard colours for flexibles under consideration for some time, and at the recent London meeting unanimous agreement was secured on a combination of green and yellow as the international identifying colour code for the earthing core. Some of the 15 countries, however, are recognising it only as an alternative to their own national standard. In addition, blue and black have been chosen as the colours of the other two cores, but with no recommendation as to which should indicate the live core. The UK delegation abstained from voting on this resolution. Such colours in this country are specified by the IEE wiring regulations committee, but it is the BSI that represents the UK on CEE. However, the IEE committee have been consulted unofficially and are not prepared to recognise any colour other than red for the live core. Thus, the British delegation could hardly have acted otherwise. On general ground, an excellent case can be made out for red as the "live" colour, but in present times it is necessary to keep in mind the increasing demands of international trade.

Meteor

This week's quick summary of electrical news faces advertisement page 20

50 c/s power for railways

EQUIPMENT USED AND METHOD OF CONTROL

UNDER their modernisation programme, British Railways have planned to electrify nearly 790 route miles of track, using the overhead conductor system operating at either 25 or 6·25 kV. The electrification scheme involves the London Midland main line and suburban schemes in the Eastern Region and the Scottish Region at Glasgow. The first stages of these last two schemes are expected to be in service by mid-November.

Features of the power supply installation and its control were described in several papers presented to the BTC conference on electric traction which began last Monday at the Institution of Civil Engineers and which is referred to on p. 511.

The papers dealt with in this article outline the demand on the CEGB's grid system and possible effects of unbalanced loading, arrangements for supplying power to the overhead conductors and restricting interference with telecommunication circuits, remote control of switching, and load measurement.

The lengths of track mileage to be electrified under the plan, together with the expected electrical loading, is shown in the table on page 508. Total demand, allowing for diversity of the different schemes, is estimated at 200 MW and the annual consumption will be about 950 million units. This demand represents only about 1% of units sent out by the CEGB last year.

The London Midland scheme caters for all classes of traffic from main line expresses to heavy goods and, as a result, the load factor at 0·67 is high.

Supply Arrangements

Before the decision to use the national grid as a source of supply for the railways could be taken, two major factors had to be investigated. These were, security requirement and the effect of railway load on the grid. Experience of bulk supplies to railways has been obtained on the extensive Southern Region system and on systems supplied by the SSEB. Reliability of the national grid for such supplies is clearly indicated by the loss of only 0·004 minutes for every million units supplied in a recent five-year period on the Southern Region.

The use of a single-phase track supply may cause trouble in the distribution system from two causes, unbalanced load and harmonics. An unbalanced railway load could produce voltage unbalance in the supply system, this in turn causing other balanced loads to draw unbalanced currents. A single-phase unbalanced load could also restrict the capacity of a network to supply balanced three-phase loads. Unbalanced currents in the supply system could cause overheating of generators.

Investigations carried out by the CEGB indicate that an unbalanced railway load is unlikely to cause difficulties provided the ratio of single-phase load to short-circuit power is less than 0·05. By taking the railway load at 132 kV the ratio is kept well below this value.

By sectionalising the overhead system, supply can be taken at different feeder stations across all three supply phases. This should effectively prevent restrictions on the three-phase power supplied by the grid system as a whole.

Each grid supply point energises an isolated section of catenary, enabling adjacent sections to be connected across different supply phases. It would, in any case, not be practicable to supply track sections from more than one feeder point if circulating currents are to be avoided. If, for any reason, a track section has to be transferred from its own feeder point to that of the adjacent section, the change over is only made after a momentary break in the supply.

Generator overheating due to unbalanced currents is unlikely to occur if the 1-phase load is less than 10% of the generator nominal rating. In special circumstances it may be necessary to fit negative phase sequence current alarms to alternators to indicate this condition, but it is considered unlikely that such conditions will arise.

Little trouble is expected from harmonic voltages provided the precaution is taken to connect the traction load at points where the supply system short-circuit level is high and a delta winding is included in the supply transformer.

Bulk Supply Points

For the London Midland and the Glasgow suburban schemes, bulk supply substations are available in convenient places allowing for supplies to be taken direct from the grid. The Liverpool Street to Southend and Chelmsford lines overhead system, originally designed for 1,500 V d.c., already has a three-phase, 33 kV distribution, and although this has been used where possible, additional cabling and track feeder circuits have had to be provided.

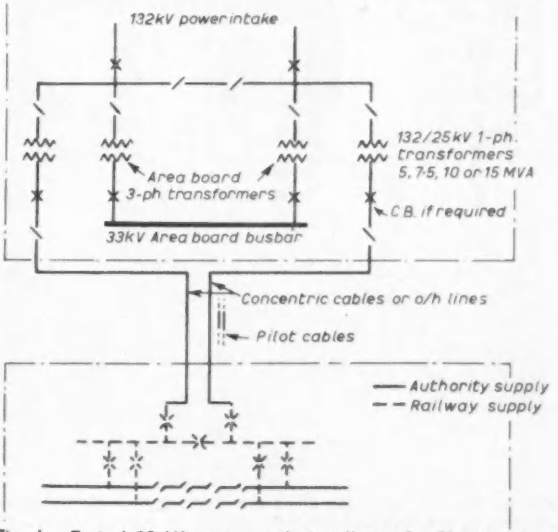


Fig. 1. Typical 25 kV power supply installation for 50 c/s railway electrification fed from a 132 kV bulk supply point

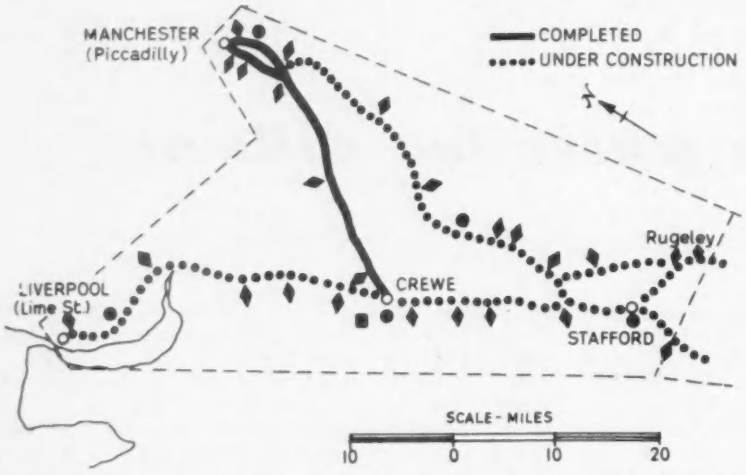


Fig. 2. The area covered by the control room at Crewe includes the recently completed first stage of the London Midland scheme from Crewe to Manchester

On both the Glasgow and Eastern Region schemes the number of low bridges and the congested conditions require considerable lengths of line operating at 6·25 kV. Here, the Liverpool Street line has an advantage because the existing 1,500 V d.c. insulators are suitable for the higher a.c. voltage. On this line, conversion to 6·25 kV is obtained through 33/6·25 kV transformers which may be either single- or three-phase or Scott connected to improve the out-of-balance loading between phases. Similar transformer arrangements are used in the London area connected to the 66 kV cable system.

Siting of the feeder points depends on a number of factors; for example, traffic density, performance expected of locomotives and supply system characteristics. Advantages of siting near junctions or route intersections must also be considered. On average, the feeder points for the 25 kV system have been sited at 25-mile intervals.

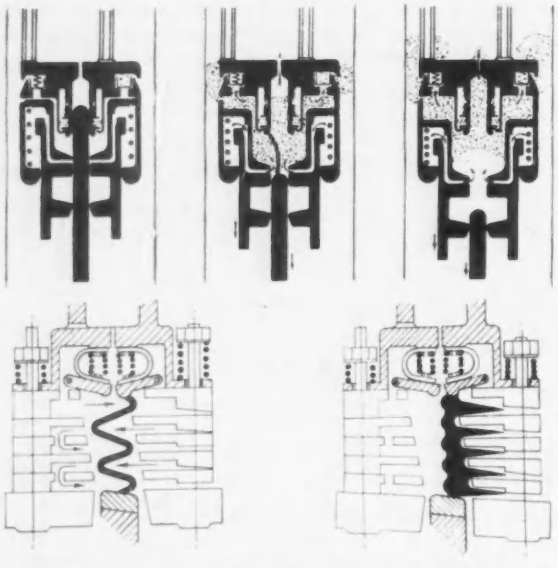


Fig. 3. The top illustration shows the three stages in the operating sequence of the Fuller oil-minimum contraction type circuit-breaker. An alternative arrangement used in the Switchgear and Cowan oil-insulated circuit-breaker is shown below it

Supply Transformers

All substations on the London Midland and Glasgow schemes and the majority on the London and suburban schemes have 132/25 kV transformers. Security of supply is assured by using two transformers for the railway feeder, often paralleled with area board distribution supply transformers.

Connection of the railway feeder transformers to the 132 kV busbars rather than the l.v. system saves the expense of additional switchgear, since in all cases it has been possible to use existing 132 kV circuit-breakers. It also avoids variations in the local area board system load affecting the railway supply. On the other hand, the short-circuit level is higher. Although the railway transformers have 132 kV circuit-breakers in common with the supply system transformers, they also have separate remotely controlled isolating switches. The 25 kV side at the grid substation is provided with isolators and earthing switches and connected to the railway substation through either a two-core concentric cable, or double-circuit overhead line, in which case a 25 kV circuit-breaker is also provided adjacent to the transformer. This breaker would be of the bulk type, rated 800 A 250 MVA, and capable of interrupting up to 3,000 A at 44 kV. Pilot cables for metering and tripping also link the grid substation to the railway feeder station.

A standard range of single-phase transformers is envisaged for the schemes. Ratings range from 5 MVA to 20 MVA in five steps for the 132 and 66/25 kV units and 2·5 MVA to 15 MVA for the 66 or 33/6·25 kV units. Transformers initially supplied were rated 7·5 MVA and 15 MVA with 14—1·43% steps of on-load tap changing. Later transformers have 4—5% steps of off-load tap changing provided. The SSEB are using 5 MVA and 10 MVA transformers with 4—2½% steps of off-load tap changing. Line-to-line connection prevents use of graded insulation on the 132 kV side and impulse tests specified call for a sequence of chopped and full waves applied simultaneously to both line terminals in addition to the normal impulse tests.

Table I. Power Demands for Electrification in hand at 25 kV and 6·25 kV

Scheme	Single Line Miles	No. of Supply Points	Max. Demand	Power Consumption Annual	Approx. Load Factor Annual
			MW	kWh (million)	per cent
L.M. Main Line					
Euston-Manchester-Liverpool	1,780	12	109	640	67
Scottish Region					
Glasgow Suburban (Stage I)	163	4	18	56	35
Eastern Region					
G.E. Conversions	174	6	49	148	34
Chelmsford Colchester ...	49	0			
Colchester-Walton ...	50	1			
London-Bishop's Stortford	105	4	13	34	30
London-Southend	172	3	27	61	26
Total	2,493	—	—	—	—

Track Feeder Cables

Cables linking the grid substation to the railway feeder substation are of the concentric type, either oil- or gas-filled. The gas-filled type, with a lower charging current, is preferred for use in tunnels. Cross-section used is 0·5 sq in., although at Crewe it has been increased to

0·85 sq in. Outdoor sealing-end type terminations are in use on the Colchester-Walton lines, but on the London Midland and other Eastern Region extensions oil-immersed sealing-ends are being used for connections to the indoor switchgear. Extensions to the 33 kV system on the Great Eastern line will be of solid type three-core cable and also an oil-filled type with solid aluminium conductors without fillers and housed in a corrugated aluminium sheath.

For the new 25 kV concentric cables, a straight-through joint has been developed. This has a conventional hollow-core oil-filled arrangement for the inner conductor, while the outer conductor is joined by applying a copper tube over the central section of the inner screen and then connecting wires from each side, over the top of the tube. Stress cones are applied over the lead sheath terminations and the dielectric is reapplied over the outer conductor in the form of an open tube supported by spacers.

Pilot cables laid with the main feeder cables are of the 110 V mass-impregnated type, each having either four or seven 7/·036 sq in. conductors.

It is convenient here, also, to mention the cable connections from the track-side feeder stations to the catenary and running rails. Connection from the 25 kV switchgear to the catenary is made through 0·15 or 0·2 sq in. single-core solid type cable. On some recent installations, mass impregnated non-draining cables are being installed alongside more conventional types to assess their performance. For the 6·25 kV connections, either 0·25 or 0·5 sq in. cables are used.

Feeder return cables from the running rails are of rubber-insulated 660 V 0·15 sq in., duplicated if necessary. The track-side cables are run in pre-cast concrete troughing if they cannot be directly buried. Where space is restricted post supports are used, aluminium cables being supported on hangers and lead-sheathed cables in asbestos cement tubes.

Track Feeder Points

Circuit-breakers and their ancillary equipment are housed in simple brick-built cabins with flat concrete roofs. Maintenance on the gear can thus be carried out, unaffected by weather conditions. The buildings are equipped with telephone communication to the control station exchange and also to depots and other strategic points such as tunnel entrances.

Switchgear has been standardised for two short-circuit ratings on the 25 kV system, 150 MVA and 300 MVA. The fault levels possible have been calculated as varying from 76 MVA with the track-side cabin at the mid-position of a two-track section to 166 MVA with the cabin at quarter-distance on a four-track section.

Proved designs of 25 kV switchgear were not available when the electrification plan was introduced and two types have since been selected. Both are of the cubicle type, but one is oil-insulated and the other is air-insulated. The oil-insulated type is made by Switchgear and Cowans and is in general use on the London-Midland and Scottish Regions, on the Eastern Region, the air-insulated type designed by Fullers predominates.

The compactness of the oil-insulated type gives the advantage of lower building cost but, on the other hand, with the air-insulated construction, fire risk is reduced and a serious breakdown can be dealt with more quickly.

Both designs are solenoid operated, arranged for remote operation from the control room. Fully interlocked hand isolators are provided on both incoming and outgoing sides.

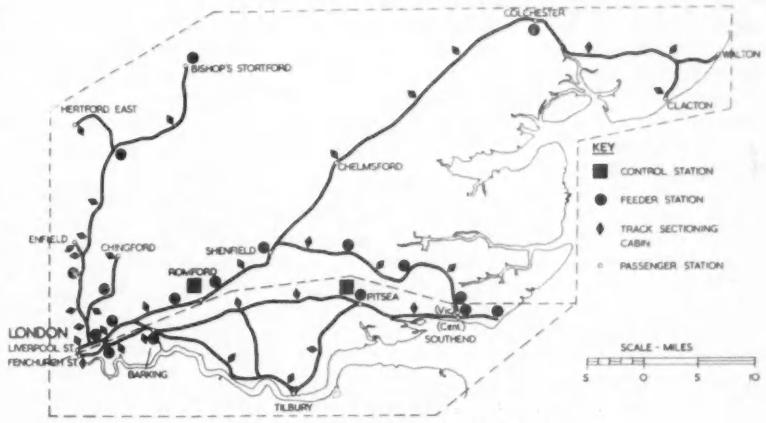


Fig. 4. The Eastern Region electrification scheme

Air-Insulated Switchgear

The air-insulated switchgear is housed in three main compartments for: the incoming busbar, circuit-breaker and circuit isolator. All circuit-breakers, isolators and access doors are fully interlocked and glass inspection panels allow the isolator positions to be visually checked. The isolators have "closed" and "earthed" positions, avoiding the need for portable earthing equipment. The circuit-breaker is of the oil minimum contraction type developed originally for the Swedish railways' 16 2/3 c/s system. It is designed for a power frequency test of 103 kV and an impulse level of 200 kV with a 1/50 μ sec wave. For the

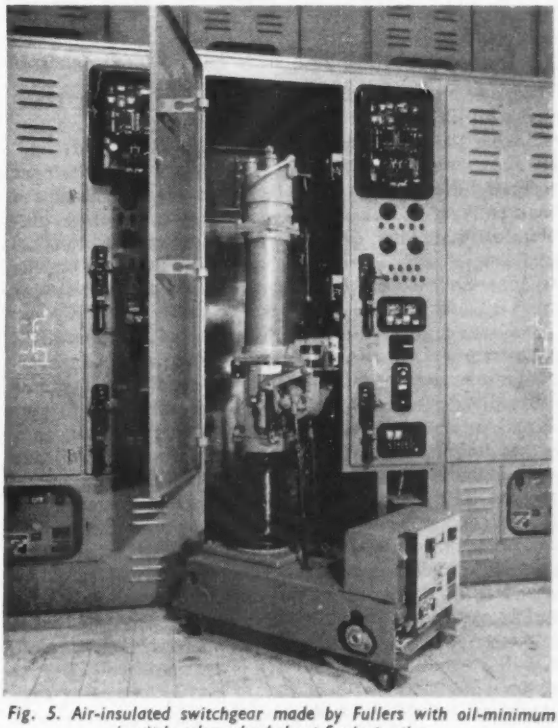


Fig. 5. Air-insulated switchgear made by Fullers with oil-minimum circuit-breaker wheeled out for inspection

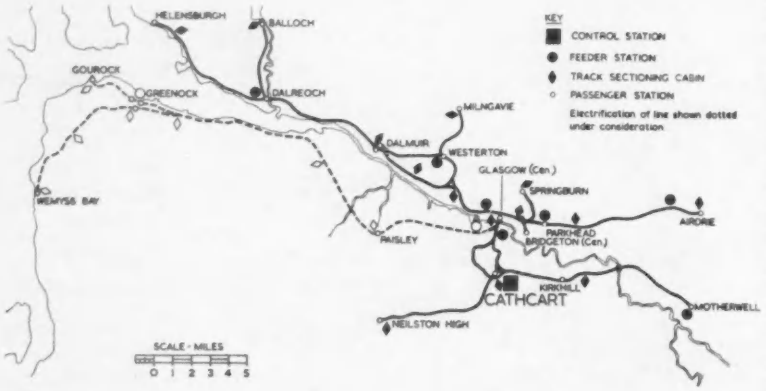


Fig. 6. The extent of the Glasgow suburban scheme, which has a high proportion of 6·25 kV lines

300 MVA type the oil content is only 5·2 gallons. The circuit-breaker is wheel-mounted with flexibles for the control circuits and can be easily withdrawn from its cubicle for inspection. The principle of the oil minimum breaker is shown in Fig. 3. In the arc contraction chamber, a piston moves downwards under the gas pressure of the initial arc. By differential action, this movement creates a pressure which drives a flow of clean oil radially inwards towards the arc, thereby contracting and cooling it.

Auto-reclosure is arranged to give a single closure after a fault clearance on the outgoing side with a time interval adjustable from 5 sec to 20 sec. An unusual feature of the circuit-breaker is the inclusion of a direct-acting overcurrent release which actuates the tripping latch directly without energisation of the trip coil, giving very rapid fault clearance in between 3·5 cycles to 4 cycles.

The equipment provides for suitable current transformers, relays and voltage transformers. Voltage transformers have the space between windings and the porcelain housing packed with quartz sand, so reducing the oil content to only two gallons.

Oil-Insulated Switchgear

The oil-insulated switchgear is contained in four fabricated steel oil chambers containing isolator, o.c.b., isolator and cable bushing, respectively. The isolators have "on," "off" and "earth" positions. The circuit-breaker includes a special self-compensating interrupter which maintains a consistently low level of arc energy and is therefore suitable for repetitive interruption. Between 10 and 20 short-circuits can be interrupted without impairing the breaker's ability to clear the maximum fault current for which it is designed.

The arc control device is designed to meet the BTC requirements for low-current, low-power factor and overvoltage interruption. Ducting and venting of the oil spaces within the Permali arc control stack are designed to give efficient interruption at low currents. With such currents, the arc traverses a sinuous path as shown in Fig. 3, due to oil vapour and pressure flow. The plate stack is clamped together by four spring bolts. At higher currents, the pressure generated is sufficient to overcome these compression springs and to force the stack plates apart. This automatically increases the venting space to an extent depending on the current flowing. The arc now follows a predominantly straight path and the extinguishing effort is reduced so that the contact gap exceeds its minimum stable breakdown value before the arc is extinguished. The arc energy is low and therefore risk of current chopping with subsequent restrike is eliminated. Similar switchgear with current rating of 1,200 A has been developed for the 6·25 kV substations.

Booster Transformers

To reduce telephone and signalling interference, booster transformers and return conductors have been installed. The cost of these methods is estimated at 5% of the total fixed equipment cost. The booster transformer has its primary in series with the overhead line and its secondary in series either with the track or a special return conductor. The transformers have a unity ratio and are in effect current transformers confining the current to the desired paths.

Auxiliary Supplies

Auxiliary supplies for heating, lighting, battery charging and signalling standby supplies are obtained from 25 kV or 6·25 kV/625/240 V transformers. The 625 V output for signalling is taken through a Brentford voltage regulator, designed to maintain the output voltage to within ±3% for an input voltage variation from −30% to +10%. The transformers are protected by a fuse unit with isolators and air-insulated h.r.c. fuse. The signalling supply is normally obtained from the local medium voltage town supply through 415/625 V step-up transformers.

Signalling supplies are generally taken at 50 c/s, but for the Great Eastern conversion and areas in the Eastern Region, where d.c. track circuits cannot be used, the signalling supply consists of two separate, fixed-phase, related single-phase supplies at 83 1/3 c/s obtained from frequency converters. A standby supply from a diesel generator comes automatically into use within four seconds in an emergency.

Other auxiliaries include 25 kV/110 V reference voltage transformers for the track distance impedance protective system and battery installations for circuit-breaker operation and supervisory control.

Remote Control of Power

In accordance with British Railways standard practice, all circuit-breakers are remotely controlled from centrally situated control stations. A voice frequency system is employed to avoid interference from the traction equipment.

The area covered by a control room may cover 600 track miles and control up to 50 track-side stations. For the London Midland scheme there are four control rooms and the Eastern and Glasgow schemes have two and one, respectively.

Two schemes are used, devised by STC and AT and E, which are arranged to be compatible. In the control room, a mosaic mimic diagram represents the track layout with circuit-breakers and motorised switches indicated by rotatable discrepancy switches. Adjacent lamps represent circuit-breaker operation, accepting and cancelling alarms and checking indications. Other lamps give warning of six types of fault including loss of standby supplies and Buchholtz relay operations.

The essential difference between the two systems is that STC use frequency modulation to superimpose the station identifying and control signals onto a single basic frequency, whereas the ATE system uses two frequencies, one common to all stations and the other particular to the station to be controlled.

Signal transmission is over pilot wires, two for outgoing signals and two for incoming signals, and one set of four pilot wires can provide complete supervisory control for up to 12 stations. The pilot lines are duplicated and additional wire pairs are provided for telephone speech circuits.

The conference continues and further reports will follow.

Conference Opening

"A landmark in railway history," was how Sir Brian Robertson, chairman of BTC, described the Electrification Conference in the course of his opening address. Over 40 papers are to be discussed at the conference, which is being attended by more than 400 delegates representing 40 railway administrations from the USA to Russia.

Sir Brian said that a.c. electrification is incomparable for providing a competitive system of traction given certain conditions, notably a consistently high traffic density. Such conditions apply on certain sections of British Railways, although they are accompanied by many engineering problems as a result of our loading gauge limitations. How these problems had been solved would be apparent during subsequent sessions of the conference. The decision to use a.c. rather than the well-tried d.c. 1,500 V system was taken in the full knowledge of its attending technical difficulties, but also in the knowledge that it held greater scope for future development both here and overseas.

Referring to the remarkable achievements of the French railways and commenting on the wide use of a.c. traction in the Soviet Union, Portugal and latterly India, Sir Brian expressed the hope that the conference would provide delegates with a rare opportunity for the exchange of ideas.

In addition to the technical papers presented on Tuesday and today, delegates will be able to inspect progress on the Manchester-Crewe line and in the Eastern Region.

After the address by Sir Brian Robertson, Mr S. B. Warder, chief electrical engineer for the BTC, outlined the reasons for choosing a 50 c/s system. High traffic density is the main justification for electrification of British Railways. Electrification of lightly loaded lines is of little interest since dieselisation offers a more readily available alternative. The Southern Region provides an example of a system where higher traffic density and increasing revenue has been promoted by the system itself. The use of d.c. for main line traction was first considered as a development of the Southern Region type of system, but using an overhead higher voltage scheme. The inflation of the 1950s, however, showed this system to be less economically attractive than had previously been supposed, especially in view of the developments in a.c. traction equipment. The a.c. system is superior in all respects to its d.c. counterpart, bringing economies in capital and running costs. Its development in the last five years, particularly in France, Portugal, Russia and now India, has been spectacular and its adoption by British Railways will have the great advantage to manufacturers of giving them operating and development experience which they can apply to overseas markets.

The electrification programme had already required development of glass fibre and PTFE insulators and had prompted the use of semi-conductor rectifiers for traction applications. Valuable experience was also being gained in the testing field by the introduction of data recording and processing techniques.

On Monday afternoon the Rt Hon. Ernest Marples, M.P., Minister of Transport, opened the exhibition of locomotives, rolling stock and accessories on display at Battersea Wharf. The exhibition is open to the public from 2 p.m. to 5 p.m. from 3 to 9 October.

Financing International Electricity

DETAILS of loans by the World Bank (The International Bank for Reconstruction and Development) for electricity supply are given in the fifteenth Annual Report of the bank covering the year ended 30 June, 1960. During this period, loans for power projects were made to Chile, Colombia, Honduras, Italy, Nicaragua, Norway, Pakistan, and Peru. Total value of these loans was $182,800,000, bringing total outstanding loans by the bank for generation and distribution to $1,605 million, out of a grand total in all categories of $5,068 million. $441 million of the electrical total are invested in the Middle East.

Besides providing loans for specific schemes, the bank staff have been active in providing technical assistance for a number of projects. For example, in the United Nations Special Fund a survey has been carried out of the electricity board needs and potential of Argentina. This was conducted by consulting engineering firms under bank and Argentina Government supervision. In Nigeria, the bank is overseeing a survey to ascertain the merits of constructing a multi-purpose dam on the River Niger.

Private Industry

Also published last week was the report of the International Finance Corporation set up by the World Bank to encourage growth of productivity by private enterprise in the less developed areas of the world. Amongst the investments made during the year was $960,000 Magrini Meridionale. This concern is to build a plant near Naples for the manufacture of low and medium voltage circuit-breakers, largely under licence from Westinghouse International. None of the other new investments of the Corporation had a direct electrical interest.

Power Loans

Details of the new World Bank schemes are as follows:

Iran. $42 million for multi-purpose scheme in Khuzestan ; 620 ft high dam, 130 MW capacity.

Pakistan. $2·4 million loan to Karachi Electric Supply Corporation for 14·7 MW diesel power plant to give rapid reinforcement of supply pending expansion of steam plant.

Italy. $40 million loan for SENN 150 MW nuclear power station on the Gariglano River, between Rome and Naples.

Norway. $20 million loan for two hydro stations of 168 MW combined capacity in mid-Norway.

Chile. $32·5 million covers 280 MW hydro scheme near Santiago and thermal station at Huasco, Northern Chile, of 15 MW capacity.

Colombia. $17·6 million and $25 million, respectively, for 117 MW additional capacity in Bogota and varied additions in the Cauca Valley, one of the most rapidly growing industrial and agricultural areas of Colombia.

Honduras. $8·8 million for first stage of 27 MW hydro scheme.

Nicaragua. $12·5 million for 50 MW hydro plant and transmission lines to supply Managua, the capital of Nicaragua.

Peru. Help towards 260 MW 10-year programme for Lima area.

Safety in industry

ELECTRICAL INSPECTORS OF FACTORIES SURVEY 1959

DEVELOPMENTS in electrical engineering practice and their effect on safety are discussed at length in the newly published report of the Senior Electrical Inspector of Factories for 1959.* Such topics are dealt with at greater length than was customary in the past, although the report includes the usual analysis of reportable accidents. One result of the changed emphasis is that electricity supply receives greater attention than has sometimes been the case in the past.

One of the supply engineering topics discussed is developments in alternator excitation. The particular problem of concern is the increasing difficulty of suppressing the field of a large alternator sufficiently quickly to ensure safety in some circumstances. The inspector instances the case of a fault in a solidly-connected auxiliary transformer, for which suppression of the alternator field is the only possible remedial action. In such circumstances considerable damage may be done and danger may arise. "This problem should be seriously re-examined." Hope of improvement is seen in the development of excitation systems using silicon rectifiers.

In an extended discussion of progress in electrical insulation, considered from a safety aspect, the inspector considers the disadvantages, as well as the advantages, of mineral-insulated metal-sheathed cables. Saying it is excellent where there is a fire hazard, he warns that it has weaknesses which may give trouble if suitable precautions are not taken. Resistance to puncture by transient overvoltages is lower than rubber and the sheath may workharden and crack if subjected to repeated flexing or vibration. In this case the insulation is liable to absorb moisture and fail quickly. Joints, if not well made, may also be points of weakness.

Concern is expressed at the increasing voltage used for arc furnace operation. Latest furnaces will operate at some 560 V maximum across phases, giving a possible shock voltage of over 320 V. This points the need for extra precautions to safeguard staff tending furnaces, if hand tools are to be used.

The inspector strongly criticises architects for their failure to provide adequately for electrical safety in buildings. He remarks that it is not uncommon to find that space allocated for a lift control room in a large building is insufficient to allow for the clearance and working space necessary to comply with the Electricity Regulations under the Factories Act. Not infrequently, access is unsafe and total space allotted to the substation is entirely inadequate.

Accident Review

In the review of electrical accidents, attention is given to subsidiary causes, shown in Table 1. These figures emphasise how essentially dangerous is testing. (A full analysis of electrical accidents in terms of apparatus involved was given on p. 428 of 22 September issue.)

* Electrical Accidents and Their Causes, 1959. Published by HMSO, 5s 6d.

Considering accidents in electricity supply, two aspects of human error are emphasised. One is an assumption that a skilled or semi-skilled operator knows more of the technical situation than, in fact, he does; and secondly, an assumption on the part of a junior engineer that experienced persons working under him, and for whose safety he is responsible, are in a better position to know and avoid danger than he is himself.

Table 1. Contributing causes of reportable electrical accidents, 1959

	Fatal	*Total*
Failure or lack of earthing	4	76
Testing	3	67
Ignorance, negligence, forgetfulness and inadvertence	22	316
Accident resulted from the fault of a person other than the injured person	6	105
Working on live gear deliberately	2	81

There is concern throughout the report with failure of oil-filled isolators or isolating switches when closed onto a faulty network. Such failure has caused fatalities, and the inspector feels that accidents will continue, in spite of all reasonable care, until isolators which have not adequate making and braking capacities have been eliminated and properly designed isolating switches installed in their place.

A similar problem occurs on medium voltage for factories, but there is greater technical difficulty in finding a solution there, since it is not easy to design a simple isolating switch of reasonable dimensions which will break heavy currents and will be capable of making the prospective short-circuit current and breaking load current. A possibility is for a simple isolator to be mechanically interlocked with a circuit-breaker, so that it can only be opened or closed when the circuit-breaker is opened.

Accidents continue to be caused by contact of cranes with overhead lines. There were eight such incidents in 1959, with eight more cases of direct contact by people or materials and tools. Altogether, there have been 86 accidents of this nature in the six years 1954-59, and 36 fatalities. "Most of these accidents could have been prevented with a little care and in many cases there was gross negligence."

Portable Tools

There is the usual discussion of accidents caused by portable tools. The inspector suggests that a useful degree of protection, which would prevent many of the accidents that have occurred, could be provided by insulated handles used in association with double pole switches, fitting of which is now becoming standard practice with British portable tools. The point of using a double pole switch is that connection with the supply will be cut off even if the conductors are reversed and switches in the wrong wire. Of course, such developments would not give full protection, but it would help men to get free and release the tool in cases where there is no one at hand to switch off when a fault occurred.

Saving London's legs

B.R. INSTALL FIRST MOVING PAVEMENT IN U.K.

EASIER travelling for Londoners who use the interconnection between the Southern Railway and LTE underground stations is assured by Britain's first moving pavement, opened last week by the Lord Mayor. It is an Otis Escalator Co. double "Trav-o-lator" installation, electrically powered, which can carry 10,000 people an hour along a 297 ft long one-in-seven incline. Including short horizontal lengths at beginning and end, each travelling platform is just over 302 ft long and 40 in. wide.

Each Trav-o-lator strip consists of 488 individual platforms, each 40 in. by 16in., surfaced with special quality aluminium and riding on ball-bearing wheels of phenolic and canvas materials. Platforms are connected together and driven by two roller chains and can travel at 180ft/min.

Electrical Drive

AEI Motor and Control Gear Division acted as subcontractors to Otis Elevator for the electrical equipment. The main drive comprises two variable speed a.c. Schrage commutator motors, each 85/42½/5 h.p. rating at speeds of 710/335/140 r.p.m. These motors run at the first speed at full speed, at the second when idling, while the third is used for inching. An over-speed of 840 r.p. is available for testing the over-speed governor, which is one of several safety devices provided with this installation.

A photo-electric control is provided to govern the speed of the moving platform. It drops from full to idling speed if a pre-set time elapses with no-one on the platform. There is also overriding control so that if a platform becomes overcrowded the platform can be slowed to restrict rate of arrival of passengers.

Motors are supplied at 415 V, and the switchgear is by George Ellison, comprising two "GEO" 400 A circuit-breakers, four fuse-switches (one 300 A and three 150 A) and two 600 A t.p. and n. link isolators.

The motors drive through a high-efficiency multi-start worm, the motor room being beneath the top landing. The coupling between each platform and motor forms the drum of an electro-magnetic brake, which is electrically held off and provides smooth stopping of the platform if necessary. All magnets are operated from a d.c. supply rectified from the main a.c. supply.

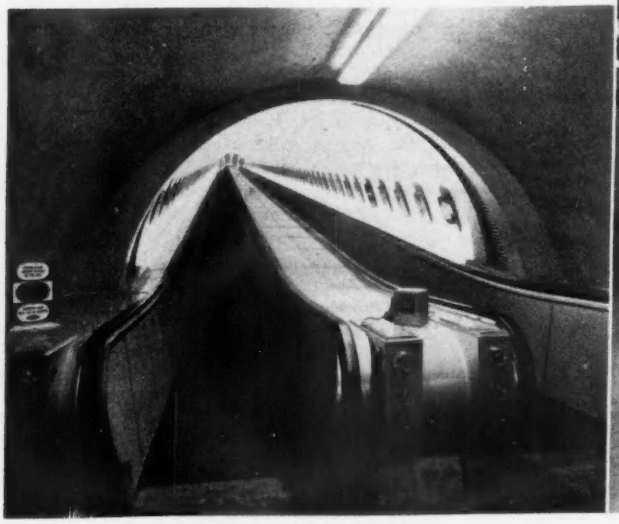
Contactor-type control gear is used for the installation, and brush shifting on the main motors is controlled by pilot motors.

Lighting

Continuous fluorescent trough lighting is used in the Trav-o-lator tunnel at deck level, with a central trough of fluorescent lighting in the ceiling at the foot of the Trav-o-lators. Provision has also been made for installation of special lighting to obviate any glare from the aluminium "travel strips." Below each platform are fixed lights and socket-outlets for maintenance purposes, both supplied at 50 V.

One of the many notable features of the new installation is its use of John Summers' "Stelvetite" plastics-coated sheet steel for lining the tunnel in a blue-brown finish.

Below, General view of Bank "Trav-o-lator" showing lighting arrangement. Right, George Ellison switchgear for the main drive, which is located through the door on the left



Supply critique

SIGNIFICANT ASPECTS OF E.C. AND C.E.G.B. REPORTS

IN many ways the financial year 1959-60 was a prosperous one for the supply industry. The reports published last week, and reviewed in outline then, and in more detail as regards the area boards on a later page in this issue, show demand leaping ahead and engineering technique keeping pace. Yet since the reports were completed the boards have become committed to higher payments for wages and salaries and for coal. Tariffs are being increased. A closer study of the reports extends the background to this move and raises some further questions about the prospects for electricity supply.

Capital Plans

Perhaps the key characteristic of the industry is its continuing expansion; indeed, accelerating expansion. Every year a high level of capital investment has to be arranged; last year, after allowing for the effect of £13·4 million drop in working capital (largely through increased indebtedness), the money that had to be found on capital account for the industry as a whole was £304·5 million (CEGB £200 million). Table 1 shows percentage-wise how it was obtained.

Table 1. Where capital came from, 1959-60

	Industry, Consolidated	CEGB	Area Boards
Capital required	£304·5m.	£200m.	£104·5m.
Consolidated surplus ...	8·8%	2·7%	20·4%
Depreciation, etc. ...	31·8%	29·6%	35·8%
Sales of fixed assets, cons. contbns., etc.	3·0%	0·6%	7·8%
External borrowing ...	56·4%	67·1%	36·0%

From the table, the relatively small part contributed overall by surpluses stands out; but against this it has to be remembered that only surpluses are readily under control of the boards, through their tariff policy and through increasing efficiency of operation. As discussed later, the book surplus of the CEGB was reduced, and the contribution from depreciation increased, by yet another change in depreciation practice.

The declared aim of the supply industry is to finance from internal sources 48% of all its capital requirements over the seven years from April, 1958, to March, 1965. In the first of the years the proportion achieved was 47·4%; in the year just ended, 43·6%. Although this is not greatly removed from expectation when the original estimates were made, the probability that the investment programme for 1960-61 will be above that originally agreed underlines the need for increased revenue margins if progress to the 48% level is to be made.

Increased Programme

One of the important announcements in the reports this year is that of a supplementary programme of 650 MW sent out capacity to be installed in the calendar year 1964, additional to a main programme of 1,727 MW. The basis for the decision to increase the programme by this amount is one of the periodic reviews that are made of overall forward plant programming. It has been concluded from this review that, while estimates of national demand have been reasonably valid in the short term, longer-term estimates have shown a persistent tendency to under-estimate.

The increase in estimated demand for 1964 resulting from the revision is no less than 1,200 MW (about 3½%). The balance above 650 MW s.o., which is to be added to the programme in the form of two 350 MW coal-fired units, is to be met by prolonging the life of some old plant. Thus the under-estimate is going to be expensive in fuel costs, though it has saved capital in the past through post-poning installation of new plant.

By 1964, total capacity of the CEGB system will be 34,833 MW s.o., of which 5·2% should be nuclear (over 1,800 MW).

Programmes in the CEGB report do not run so far ahead as they have previously. This is because of success in the period required for planning and building a power station. Decisions about provisional programmes are being delayed so that the latest load estimates can be used. For example, the 1965 programme will not be settled until later this autumn, although it is known that it will include the first supercritical set and also the first 500 MW single-shaft machine.

Technical Advance

The CEGB report discusses the complexities of pressing forward with technical advance at some length, with particular reference to the decision to go to supercritical steam conditions. Estimates obtained for a 375 MW set operating at 3,500 lb/sq in., 1,100°F and 1,050°F reheat suggested that the overall cost of producing electricity would be about the same as for a 350 MW subcritical unit. This result has to be seen against the conclusion that a 500 MW single-shaft machine is practicable and that it should give the same fuel cost as for a 350 MW machine, but lower capital costs. The conclusion reached in the report is that prospects of general employment of super-critical steam conditions will be dependent on development of materials and techniques enabling plant costs to be reduced. Orders for two units in this class have to be seen as encouragement for such development.

The step upwards in size and pressures for generating plant is matched on the transmission side by the beginning of work for 550 kV transmission and the rapid advance to trial working at 380 kV.

What the advance in designs means in savings is vividly presented in the opening chapter of the CEGB report. While a 30 MW turbo-alternator weighs about 8·3 tons/MW, a 350 MW design will weigh only 3·1 tons/MW. For a 180 MW station housing six 30 MW sets, the building volume is 39·4 cu ft/kW; for a 1,100 MW, two-set station only 22·1 cu ft/kW. Stations being planned may be built for only £40 to £45/kW.

Generation Costs

An important element in the industry's overall result for 1959-60 was the substantial fall in generating costs, coming partly from a 5·5% decrease in average cost of coal as delivered to power stations, and also from an improvement in thermal efficiency from 26·10 average to 26·53%. Both these figures are a little misleading when financial savings are being considered. The coal figure requires correction from the aspect that the calorific value was substantially lower; and attention is also required to the increased use of oil, which was cheaper. Working on heat content, fuel cost fell by 4·8%. The efficiency factor needs conversion to a percentage improvement with respect to the previous year's figure. This works out at 1·6%. Combined, the two figures give an improvement of 6·5% in electricity generated per pound spent on fuel.

Load Factor

There is concern about falling load factor in some of the area board reports; but it seems that the fall from a recorded 47·0% in 1958-59 to 46·5% in 1959-60 was a reflection of the difference in the weather in the two years. Had the weather been "standard" in both years, the comparison would have been an improvement from 46·5% in 1958-59 to 47·0% in 1959-60.

Depreciation

The year saw several changes in depreciation practice, which in turn led to book-keeping alterations that disguise in some ways the significance of the figures in the accounts. The most important change was made by the CEGB. Whereas the practice has previously been to defer depreciation provisions for new generating plant until it is commissioned, the new basis is to base depreciation payments on expenditure incurred up to the end of the previous year. The result of this was an extra £4·5 million on a revenue account item which, at £57·5 million, represented 15·1% of the Board's turnover.

Area boards made various minor changes in depreciation provisions. They already use the basis to which the CEGB has now changed for generating plant. For the industry as a whole depreciation takes 16·9% of turnover.

Contracting and Fittings Sales

An increase of £2·9 million in the figure for surplus on contracting and sales of fitting activities, which was £6·0 million, was the outstanding feature of area board trading, and deserves closer attention.

The first fact that stands out from the figures is that change in hire-purchase sales had most to do with the increase. Turnover was up £12·8 million at £69·5 million. Of the increase, only £1·3 million is represented by cash and normal credit sales; £11·5 million is extra trade conducted through h.p. agreements and the like. Turnover on electrical contracting has hardly changed at all, only £0·3 million up at £18·5 million, but sales of fittings is £12·6 million up.

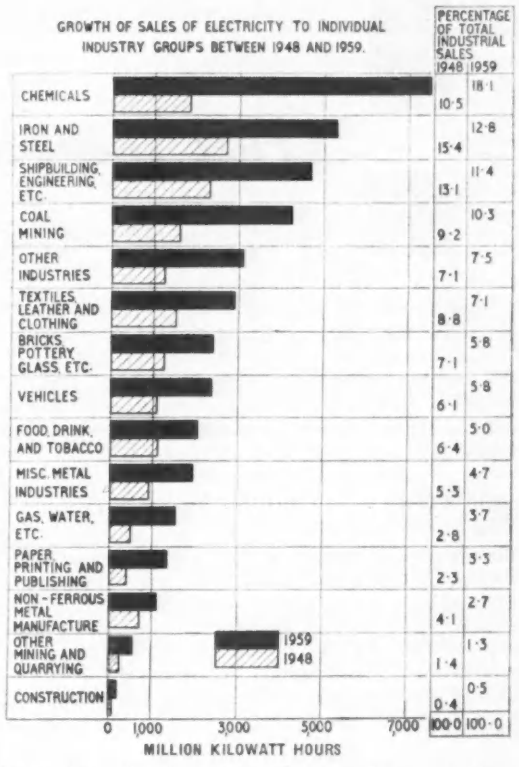

GROWTH OF SALES OF ELECTRICITY TO INDIVIDUAL INDUSTRY GROUPS BETWEEN 1948 AND 1959.
PERCENTAGE OF TOTAL INDUSTRIAL SALES
1948 1959
CHEMICALS 10·5 18·1
IRON AND STEEL 15·4 12·8
SHIPBUILDING, ENGINEERING, ETC. 13·1 11·4
COAL MINING 9·2 10·3
OTHER INDUSTRIES 7·1 7·5
TEXTILES, LEATHER AND CLOTHING 8·8 7·1
BRICKS, POTTERY, GLASS, ETC. 7·1 5·8
VEHICLES 6·1 5·8
FOOD, DRINK, AND TOBACCO 6·4 5·0
MISC. METAL INDUSTRIES 5·3 4·7
GAS, WATER, ETC. 2·8 3·7
PAPER, PRINTING AND PUBLISHING 2·3 3·3
NON-FERROUS METAL MANUFACTURE 4·1 2·7
OTHER MINING AND QUARRYING 1·4 1·3
CONSTRUCTION 0·4 0·5
1959
1948
0 1,000 3,000 5,000 7,000
100·0 100·0
MILLION KILOWATT HOURS

Fig. 1. How sales of energy have increased since vesting day

According to the estimates of the boards, this extra business has been carried out with an increase in direct costs of £9·7 million, and of £1·2 million in indirect costs—things like salaries, transport, publicity and a proportion of the boards' general charges. It is the figure obtained after these costs have been allowed for that appears in the revenue account. But a separate estimate is made of the costs of rent, rates and insurances of showrooms so far as they are attributable to sales of fittings and contracting. The amount concerned is relatively small, and the corrected surplus is £6·0 million.

It is not always realised that the turnover figure for the contracting and sales of fittings work does not come directly into the published revenue account, which thus understates each year the real turnover of the industry. Overall, the high rate of 8·6% of turnover was earned during the year in this business, compared with 5·5% the year before, and 4·8% overall in the electricity supply.

Area Board costs

Many of the costs of the area boards continue to fall. Distribution cost for 1959-60 was down to 0·092d/unit, with a range from 0·074d in the NWEB to 0·146d in London. Consumer service at 0·047d/unit varies from 0·034d/unit in South Wales to 0·086d in London, although apart from London and the SWEB (0·068d) costs are grouped closely, with the next highest 0·049d. Meter reading, billing and collection has been brought down to an average of 0·031d/unit, with South Wales lowest at 0·021d. Administration is now only 0·033d/unit, and is spread from 0·026d to 0·058d (SWEB). This last category in the first of the nationalised reports showed a range from 0·070d up to 0·169d, at the price levels of 1948-49.

Area board review

1959-60 ANNUAL REPORTS SURVEYED

THROUGHOUT the area board reports published last week runs concern about quality of supply. In discussions of capital requirements, the need for reinforcement looms large, with evidence of concern to give better continuity of supply through extending such available techniques as high-speed reclosing circuit-breakers.

Engineering

The SEEB, for example, are one of many boards planning more installations of auto-reclosing switches, lightning arresters and surge absorbers. They are also extending the use of mobile generators so that essential supplies can be restored temporarily. In another facet of the same idea, the SWEB have brought into use a 33 kV portable cable for temporary and emergency connections, together with appropriate terminations and supporting rig. This is additional to the now-proved 11 kV cable equipment.

EEB contribution to the problem has included development of automatic fault alarm systems from unattended substations, using the public telephone system. This board voice the general concern, saying that with the area's financial position improved and a substantial proportion of new finance being provided from internal sources, they feel better able to meet expenditure needed to provide a higher standard of reliability.

Impressive evidence of the value of auto-reclosing in rural h.v. lines comes from the MEB. Analysis of 1958-59 experience has shown that a line with auto-reclosers has only 10% of the lightning interruptions per 100 route-miles that occur without such protection.

Apart from continuity of supply, there is the question of quality, especially in terms of voltage at consumers' terminals. A trouble referred to by several boards is that of obtaining substation sites essential to enable reinforcement to proceed even when the necessary capital has been allocated. Some boards are experimenting with buried transformers to ease this situation, but the EEB comment that the high costs of such methods, plus the presence of apparatus of other statutory undertakings, limits the use of the technique to a few special cases. The SEB, faced with severe space restrictions in one transformer chamber, have had to resort to cold-rolled steel in a special single-phase design to give 400 kVA capacity in space usually occupied by a 300 kVA unit.

The Manweb Electricity Consultative Council (ECC hereafter in this survey) invited the Board to use the good offices of its local representatives to ease the obtaining of substation sites and wayleaves. Amongst other consultative councils to concern themselves with engineering topics is the SWECC, who express concern that there is still no decision at national level about earthing; they feel it is time there was an answer to this, and go on to remark that the problem is particularly difficult in the southwest, and that consumers look to the Board to provide the answer.

Operationally, the year was relatively easy, with few bad storms or natural calamities. However, even the fine dry summer brought some problems of its own. Special arangements had to be made for the NEEB 66 kV system because shortage of cooling water restricted generation at the North Tees station; and the YEB experienced several serious interruptions to supply because the sustained drought deprived insulators of their normal washing by rain.

Electroheat for industry figures largely in newly given industrial supplies which are reckoned worthy of mention in individual reports. A comment on the growing use of electric steel furnaces is the need for the YEB to arrange for a supply of 40 MVA for manufacture of electrodes for arc furnaces.

Reporting continued satisfactory service with their single-wire earth-return line, the SEB say the technique is now thought unlikely to find widespread application. Another out-of-the-ordinary technique, peak load generation by gas-turbine generator at a SWEB station, has given every satisfaction, and a second set is being installed. This Board is also installing additional diesel generating capacity in the Isles of Scilly.

Two boards comment on the changes in organisation of the manufacturing industry, in its effects on prices. Lower prices for cables and transformers resulted so far as the LEB were concerned. The MEB comment that amalgamations tended to reduce the number of available suppliers, but made possible the placing of larger orders, to mutual advantage. Incidentally, the LEB express the opinion about plastics-insulated cables, that they offer "no saving in price, and disadvantages in use."

Greater use of surge diverters rather than co-ordinating gaps for 66 kV substations is reported by the YEB, who

Table I. Area Board Results compared with 1958-59

Area Board	Cost of Electricity		Contracting, etc., account % of Turnover	
	Overall d/unit sold	Running charge in BST d/unit	Indirect costs	Surplus
London	**1·293**	**0·671**	**14·8**	**9·6**
	1·324	0·783	12·9	5·7
S. Eastern	**1·238**	**0·642**	**14·5**	**11·0**
	1·233	0·747	15·9	8·2
Southern	**1·163**	**0·595**	**15·4**	**10·7**
	1·184	0·703	18·0	6·7
S. Western	**1·129**	**0·624**	**15·8**	**8·8**
	1·197	0·746	17·1	7·5
Eastern	**1·169**	**0·614**	**15·5**	**9·1**
	1·210	0·725	15·8	7·2
E. Midlands	**1·014**	**0·515**	**14·0**	**9·5**
	1·038	0·588	16·4	6·0
Midlands	**1·052**	**0·563**	**15·8**	**8·9**
	1·081	0·538	18·0	5·5
S. Wales	**0·883**	**0·534**	**17·7**	**6·1**
	0·921	0·597	14·4	7·7
M. & N. Wales ...	**0·984**	**0·558**	**14·0**	**9·6**
	1·049	0·664	15·6	5·7
Yorkshire	**0·914**	**0·469**	**14·1**	**9·7**
	0·963	0·557	17·1	4·7
N. Eastern	**0·981**	**0·545**	**10·1**	**12·0**
	1·064	0·664	12·6	7·8
N. Western	**1·053**	**0·563**	**14·4**	**9·2**
	1·090	0·656	16·4	5·4

1959-60 figures bold; 1958-59 ordinary type.

Table 2. Area Board Commercial and Engineering Statistics, 1959-60

Area Board	Consumers at 31.3.60 x 1,000	Increase during year x 1,000	Net maximum demand MW	Maximum demand 1958-59 MW	Load factor %	Increase in circuit miles of h.v. lines and cables	Increase in circuit miles of l.v. lines and cables	Consumers changed to standard a.c. supply
London	1,772	12	2,489	2,310	38·1	126	168	58,972
South Eastern	1,253	32	1,645	1,397	39·9	288	236	26,488
Southern	1,388	43	2,093	1,827	41·2	583	365	9,947
South Western	771	18	876	787	46·4	592	200	3,375
Eastern	1,789	45	2,495	2,275	41·8	674	374	11,053
East Midlands	1,335	31	1,931	1,796	45·5	351	335	19,188
Midlands	1,424	32	2,511	2,368	45·9	533	292	23,035
South Wales	639	14	1,022	991	62·6	738	128	5,969
Merseyside and N. Wales	926	21	1,294	1,211	52·6	532	254	8,137
Yorkshire	1,517	25	2,292	2,168	49·6	488	285	25,775
North Eastern	1,039	21	1,203	1,133	53·7	480	167	6,444
North Western	1,646	29	2,415	2,257	46·4	425	230	12,567

say the change reduces the danger of simultaneous flash-over of gaps at duplicate substations.

Research

Area board research is co-ordinated through the Electricity Council, and the general outlines of the work given in the EC report, summarised last week, are reflected in individual board reports. For example, the widespread work with plastics-insulated mains cables and services comes into this category. There is also much attention to the problems of supplies for arc furnaces, in so far as they may cause voltage fluctuation. However, there are some individual research projects which deserve closer attention.

Use of series capacitors in lines is being tried by some boards. The NWEB have a series capacitor in an attempt to reduce voltage flicker on a 19 mile-long 33 kV line supplying an arc furnace at Alston, Cumberland (1,800 kVA demand). Shunting resistors were provided during the year on a 6·6 kV series capacitor which the YEB have been operating in an attempt to deal with voltage fluctuation caused by a spot welder installation. The resistor solved difficulties that had arisen with the switching of the capacitor and its associated distribution transformer, but the high harmonic content of the magnetising inrush current each time the welder is switched on produces a voltage drop which is not appreciably affected by the series capacitor, so this has been withdrawn from service. Better success has been experienced by the NEEB, who have a series capacitor on a 11 kV line. Spark gaps of changed design installed on this have been found to operate satisfactorily without erosion.

Transformer noise is worrying boards, increasingly so as the finding of substation sites becomes more difficult. SWEB work on the problem has included sheet metal cubicles for transformers, lined with sound-absorbing material. Another widespread problem is that of providing meter reading facilities without access to the house. The EMEB has designed a service unit for building into the outside walls of private dwellings, permitting outside meter reading. They are reported to be checking on manufacturing potentialities and cost. In the YEB there have been experiments with providing a cupboard for meters and services in the porch of a house. The arrangement is reported to have become increasingly popular.

Earthing at substations where soil conditions are unfavourable concerns the NEEB. They have been conducting trials with what is described as a "mineral material" in the hope of reducing resistance around earth electrodes, but results seem conclusive that this is not the answer to the problem.

Apart from the work on plastics cables, work is proceeding on cable heating, with the SEB involved in terms of moisture movement around p.i. cables installed in the ground. Flat 33 kV oil-filled cable, which does not need oil tanks along its route to maintain pressure, has been installed by the EEB. Mechanical jointing of cables is the subject of LEB trials. In the overhead line field, the SWEB report investigations continuing on problems of vibration of aluminium alloy conductors and "into possible use of preformed line products."

There is much utilisation research work on heating, and many floor-warming and block heater installations are being instrumented to give precise information on effectiveness and electrical load characteristics. Amongst other work is testing of ceiling heating for domestic premises by the NWEB, who have also erected two small identical buildings to study the behaviour of floor-warming in direct comparison with conventional electric heating systems.

Commercial

Active load development over the whole field, rather than a few sparkling successes, marks the reports of the commercial departments of all the boards. Much of the work has been concerned with off-peak loads, which are treated later in this review; but the LEB make a special point of mentioning that the accent in their commercial work during the year was on all-the-year-round and summer use of electricity. Of course, sales of fittings reached new record levels during the year, though there was no remarkable expansion in contracting work—but Manweb report more installation work carried out for consumers than in any previous year.

An interesting point about what determines "class" of consumer for tariff purposes is raised in the report of the EECC. A children's home has been ruled non-domestic, but the decision is to be reconsidered "as soon as results of full tests to ascertain characteristics of electricity consumption in homes of this kind" are available. Also concerned with consumer consumption characteristics were the South Wales EB, who have carried out a detailed study of cost of supply to various classes of consumer. This has revealed that consumers with low load factor have been making insufficient contribution to the cost of supply.

Special interests of individual areas stand out in the commercial sections of reports; the NWEB comment on a 34% increase in sales of electric catering equipment, "particularly promising with fish frying ranges." Special attention to electro-heat has been paid by the MEB, with evening lectures organised in conjunction with the local college of technology. Progress with electrification of collieries, particularly coal winding, attracts comment in the NEEB report. Local preference even at district level is given by the EMEB as their reason for not being in favour of bulk buying for domestic appliances. They think local

managers are better able to cater for varying local tastes and habits by purchasing supplies themselves.

There is widespread reporting of running down of hire schemes of various kinds, and the NWEB is to abandon its scheme for hiring electric motors. This same Board reports that its "Electricity comes to Town" travelling exhibition proved more successful as a selling medium than its "House of the Future" predecessor, although the latter attracted larger audiences.

Off-peak

Almost every board reports success with off-peak heating, and it is possible only to select some of the typical comments and the more significant statistics.

A noticeable trend towards use of electric floor-warming in domestic premises is noted by the LEB, who had 1,300 dwellings connected by the end of the year and 5,000 more under construction. Total floor-warming load of the SEB at the end of the year was well over 10 MW, and it was growing rapidly. This Board has also more than doubled block storage heater load in commercial and industrial premises since 1957, and is approaching the 30 MW mark.

Table 3. Rural Electrification Progress

Area Board	Number of farms in Area	% connected at 31 Mar. 1960	Average consumption per farm consumer kWh
London	82	100·0	7,927
South Eastern	14,400	82·5	9,368
Southern	25,776	88·7	9,472
South Western ...	31,000	67·0	5,840
Eastern	31,600	82·6	7,510
East Midlands	27,400	92·6	7,109
Midlands	26,600	83·5	7,475
South Wales	23,500	63·1	4,025
Merseyside & N. Wales	33,400	71·5	4,529
Yorkshire	21,291	93·6	5,898
North Eastern	18,838	81·6	5,101
North Western ...	24,505	87·5	7,456
England and Wales ...	278,392	80·7	6,739

A more sober note about the effect of such off-peak loads comes from the EEB, who point out that although the 17 MW of off-peak heating load added during the year was double that of the previous year, ten times that would be needed to improve the load factor by 1%. Block storage heaters and floor-warming together accounted for over 8 MW of demand newly connected to the NEEB system during the year—including block storage heating for a lighthouse. The total of new connections included 160 flats and 60 houses, and the Board report negotiations complete for installations totalling ten times as many. YEB figures show 1,636 dwellings using floor-warming by the end of the year, and during it 92 commercial and industrial consumers installed floor-warming with aggregate load 3·5 MW.

In the reports, it is especially noticeable how floor-warming is making progress in churches, for which early estimates were that it would not find great application. The concern about the effective ban on block storage heaters for domestic premises, which is imposed by purchase-tax regulations, is discussed by the EMECC. They raise the question of the effort needed by the supply industry to convince manufacturers that there might be a large enough demand for a heater suitably designed for domestic premises. The Council feel this might be so, even if purchase-tax on all block heaters had to be accepted. They continue "the supply industry will obviously have to prove its case for the extended use of these heaters. To do this it will be necessary to carry out further experiments with a redesigned block heater more suitable for domestic premises than the present industrial type."

Apart from heating of buildings, there is interest in such off-peak loads as road heating and electrode boilers for heating swimming pools, operating only off-peak. Also, there is the possibility of interruptible loads to be exploited. The NWEB reports 100 MW reduction of its peak load through special interruption agreements with consumers.

Administration

All the reports discuss the recommendations of the Weir Committee which studied co-operation between gas and electricity boards, and there is special attention to meter reading. Many boards are interested in experiments with estimating consumption for some quarters, and billing consumers on that basis. The LEB is working on a one-in-four quarters estimated basis in one district. Manweb are using postal meter reading in some rural areas, considering it better than estimating readings for some quarters—but they say they would prefer quarterly visits with estimates when the consumer is out, in urban districts.

The SEB have accepted the suggestion that estimated meter readings for two or three quarters should be offered to credit-worthy consumers "who will undertake to pay without querying the account." EMEB have an experiment with estimating one quarter each year, and initial reaction of consumers has been on the whole favourable. For some rural areas, MEB plan to use estimated readings in alternate quarters. The NEEB is asking isolated consumers to use self-reading meter cards in alternate quarters. If the experiment is successful, it may take in urban areas.

There was only slight enthusiasm for joint activities with gas boards. The EEB say there are no financial savings to offset the administrative disadvantages of joint meter reading in rural areas. However, they are looking at the possibility of according mutual showroom facilities for payment and emergency purposes in small towns where showrooms are not manned all the time. The SWEB is using one gas showroom for payments of accounts.

Aside from meter reading and combined operations, there is interest by several boards in the possibility of using digital computers in accounting systems. South Wales EB report that they are introducing an easy payments stamps scheme, with stamps sold at showrooms.

Rural Development

Sales of electricity to farmers during the year were down because the unusually dry summer obviated the need for electrical crop drying. Many of the reports record the hope that the 85% national target for proportion of farms connected will be reached earlier than expected originally. Estimates include SWEB, 1965, three years less than original estimate; EEB, 1961; South Wales EB, 1964, four years less.

Concern with the uneconomic nature of rural electrification is expressed by the SWECC and the South Wales EB. The former say that, although the average revenue per farm has risen to £44 p.a., it is still too low to make rural supply a commercial proposition, while the latter complain at having spent £1 million during the year on rural electrification which will be uneconomic.

Consultative Councils

Something has been said in these notes about the consultative councils. Their reports this year are full and provide ample evidence of the steady work they are doing in presenting informed internal criticism.

An example of the concern of consultative councils with subjects other than tariffs is given in the SWECC report. The Council have been concerned about complaints of transformer noise, but they have been told by the board that capital spent on noise reduction like that on undergrounding mains can have the effect of depleting the funds available for rural development. The Council are taking up this point with the Minister.

Consideration has been given by the NWECC to a request by a local authority that the board should officially test all domestic electrical installations when a change of tenancy takes place. The Council did not support this request. They thought it was more important to have an inspection service on which consumers could call whenever they were in doubt about the quality of their installations.

Despite the widespread evidence of concern with such general points, it is the various payments a consumer has to make that received most attention by the boards—plus, of course, the question of priority for connection of rural supplies. There were few tariff changes to consider during the year, and capital charges and details of application of tariffs attracted more attention. The Manweb ECC considered the board's refusal to offer hire-purchase terms to consumers who had a bad paying record, either for h.p. accounts or on their electricity supply. The board would not enter into hire-purchase agreements with consumers for whom cut-off instructions have been issued within the previous 12 months, or those who are paying their accounts by instalments. The ECC were not happy about several points arising from this practice and discussions were held with the chairman. The outcome was an agreement that the policy should be reviewed after a time.

The South Wales ECC suggested to the board that private contractors were making available deferred payment facilities for wiring work and called for the board to do likewise. However, the board's view was that no evidence could be found to support this contention and that in any case there were financial difficulties and staff difficulties about the idea. The MECC asked their board to look into the possibility of operating an inspection system for domestic installations on a contract basis.

The SEECC express concern at the increasing number of representations concerning high consumption. They think the basic difficulty is that consumers are unaware of the amount of energy used by different appliances. A London EB practice of charging a minimum of 7s 6d for attending at consumers' installations to replace fuses, etc., is supported by the LECC.

Most representations by consumers to ECC's are settled at local level and figure in the reports only as aggregated statistics. However, a number of individual cases are reported, of which perhaps the nicest is the consumer who thought he should be allowed to use one immersion heater at night on a restricted-hour tariff and another in the same tank during the day on the standard tariff. He did not find himself supported by the MECC and took his complaint to the Electricity Council, whose views are awaited at the end of the financial year.

DOMESTIC ELECTRICAL ACCIDENTS

SEVENTY-NINE electrical fatalities on domestic premises are described in the annual précis of reports of such accidents that have come to the attention of the Home Office during 1959. Commenting, Mr S. J. Emerson, HM Electrical Adviser to the Home Office, says that the statistics show that the majority of electrical accidents in the home are not caused by faulty or ill-designed apparatus but, rather, by ill-use. An important factor in many accidents is failure to disconnect portable apparatus completely from the supply when not in use, by pulling out the plug.

Five persons were electrocuted as a result of appliances falling into baths. In other bathroom incidents, casualties had touched electric heaters, a convector type clothes drier kept in the bathroom, a record player, and in one case, a portable immersion heater used to heat water in a washing machine. Insulation failure and bad earthing were contributory factors in most cases.

Electric blankets receive special mention in the précis. Burns as well as shock are involved in some accidents. In one case the cause of death was carbon monoxide poisoning and asphyxia due to fumes from a smouldering electric blanket which had been allowed to overheat. Mr Emerson comments that if a blanket is frequently folded in the same place it will eventually break down at the fold and may start to smoulder.

In one fatality an electric kettle developed a high-resistance fault from element to casing. The fault current was sufficient to burn through the earth wire, but not sufficient to blow the fuse protecting the kettle circuit.

Young children again figure in tragic accidents due to improperly wired electrical equipment and particularly when reversible connectors are used, and are left lying about with the far end of the flexible plugged in.

The need for attention to earthing in the interests of workmen is underlined by two cases in which plumbers were killed. One was in the roof space, and stood on some lead-covered wiring, the sheath of which had not been earthed. He received a shock when he touched a water tank. The other man was electrocuted while examining the piping beneath the floor of a house. At the same time, he touched the unearthed lead sheath of a cable which was live as a result of a fault in which a supporting clip had cut through both sheath and insulation.

Attempted Repairs

Accidents when unskilled people try to mend electrical equipment while it is live are perhaps to be expected. Attempts to adjust contact tubes on plugs and connectors are particularly troublesome. A point emphasised by Mr Emerson is that special dangers apply with radio and telecommunication equipment, and it is especially important that such repairs should be attempted only by persons who have adequate technical knowledge.

A final point to note is that the earth continuity conductor of an installation may itself result in danger. A woman was electrocuted when she touched an earth wire while she was washing the floor. With her hands wet, she was abnormally sensitive to electric shock. In another case a fault inside a plug made a connected washing machine alive through the earth wire.

Concluding his covering note, Mr Emerson stresses that experience over the year confirms that electricity is the safest form of power, but that installation and maintenance of electrical equipment should be undertaken only by skilled and experienced people.

NOTES ON WIRING

BY MEGOHM

SOME long time ago I mentioned the appearance of "Observation Platforms" at the big building sites in London, and at once received many letters about their possible uses. It was suggested that the electricians could give conduit laying demonstrations, etc. and there were other suggestions which proved many of my readers have humorous streaks in them. Most of these platforms are on sites which start below the ground and are of little use when the building has reached ground level. However, whilst travelling on an omnibus in the region of London Bridge I was surprised to see at one building site a "Tele-viewing" platform! I really had to look twice for I thought that my eyesight was playing tricks with me. But no, in a darkened area, formed by boarding, a television set was showing a workman toiling away on the roof, or at least the topmost part of the structure. I did not have the time to alight from the omnibus and study the arrangement properly and can only assume that it was a closed circuit television with a camera set up in the structure.

What possibilities such an arrangement offers! I can see all the "wits" getting ideas already. For instance, a receiver in the foreman's office so that he can do his paper work and supervise as well, or even a receiver at head office so that the boss can watch, and learn, what goes on! There are all sorts of ideas flowing through my mind.

One thing I did not find out and that was whether or not there was "sound" laid on for the viewers. Now, there *is* something which would attract the crowd, especially if electricians today have the same vocabulary as they did when I was young!

Height of Switches, etc.

Recently I commented on a suggestion that the standard switch height of 4 ft 6 in. should receive some thought. This suggestion came from people interested in the welfare of disabled people. Now I see that those interested in the care of the elderly have suggested that more thought be given to the height of switches and sockets in houses built for such people. This I can well understand and I was rather surprised that no mention was made of better switching facilities for such people, a matter which, in my opinion, is more important that the height of switches.

I have looked over a block of maisonnettes intended for the elderly, and the first thing which struck me was the bad lighting in the entrance and staircase and the method of switching the lights. I feel that the lighting in such entrances and staircases should be time-switch controlled. Inside the houses I saw rooms with two doors, but the light was switched at one door only, which meant that the occupier had either to walk in the dark or to switch on another light to enable him, or her, to leave the room safely. I also noticed a tendency to keep the cooker control unit very high. As it was sited over a workbench, even I found it difficult to reach for switching on or off. The unit had no indicator light, which I consider necessary in such situations. In fact, I feel that these lights should be a standard item in both cooker units and water heater switches.

One item in this block of maisonnettes which did appeal to me was that the meter could be read from outside the living premises and, therefore, neither delayed the meter reader or disturbed the occupant. Also, and this has nothing to do with electricity but may be of interest to my readers, there was an arrangement where milk and bread, etc. could be left in a small cupboard from the outside and removed by the occupant from the inside. The only suggestion I could put forward on this item was that by using electricity the doors could be interlocked so that no danger of a forced entry was present.

Earthing of Sockets

I recently commented on a socket which provided for "double" earthing. That is to say, instead of one fixing screw hole having earthing facilities, both fixing holes were suitable for obtaining earth continuity to the metal box. This particular make was the first one I had seen but another manufacturer informs me that they have had such a box on the market for some time now. This manufacturer added that it was their wish to see this arrangement become standard, and I sincerely hope that it does. Not a couple of days had elapsed from the time I mentioned this socket when I had a practical demonstration of the need for double earthing. I will not go into details but must just say that had the socket in question been "double" earthed then a friend of mine might not have telephoned me in such a panic.

Responsibility on Sites

I have complaints by electrical contractors working on large sites about the attitude of builders to damage done to conduits and cables, etc. The impression that I got from one contractor leads me to think that building workers just ignore other people's material with the result that electricians have to check their installations constantly to ensure that the installation is in order. In particular this applies to situations where conduits are laid on the shuttering and the concrete is then poured on. This results in fairly heavy traffic of wheelbarrows, etc., which can easily knock the conduit out of position even if it is fixed in position. Another situation is where holes have to be cut through floors where conduits have been laid. In many cases the electrician is completely ignored and he is not consulted whether or not there are any conduits buried in that area. When the damage has been done the builder, so I am told, refuses to pay for the damage and the electrical contractor is left to hold the baby.

Another complaint is that the main building contractor refuses to off-load any electrical material if the electricians happen to be off the site. I must say at once that I have not come up against any of these problems myself and they only came to light at a site meeting which I attended recently. Certain pertinent questions were asked by the electrical contractor during the meeting which prompted me to question him afterwards. His opinion was that the normal 2½% allowed to the main contractor by a sub-contractor should cover off-loading, etc. and guarantee that any damage done by the builder should be paid for by him.

I hope that these complaints are only isolated cases, for good relations are so necessary on all building sites.

OVERSEAS NEWS

from our correspondents abroad

PAKISTAN

Cable Factory

Another cable factory has started up in Pakistan. Known as the Sunshine Cable and Rubber Works, its plant at Tongi, 15 miles from Dacca, in East Pakistan, was formally inaugurated earlier this month by the Director-General of Industries, Trade and Supply, Mr M. A. Kareem Iqbal. Initially, small-sized cable is being produced, but later it is planned to manufacture h.t. cable. The firm claim to be able to meet the entire demand of East Pakistan, with a surplus for West Pakistan. The management is already exploring the possibilities of exporting to the Middle East.

Power Commission

The Pakistan Government is to appoint a Power Commission who, *inter alia*, will undertake a detailed study of the present generating capacity of the country and its utilisation, the Minister of Fuel and Power, Mr Z. A. Bhutto, has confirmed. The Commission will also be entrusted with the task of governing electricity tariffs. Fixing of the power rates has so far been exclusively entrusted to the Water and Power Development Authorities in East and West Pakistan.

INDIA

Plant Manufacture

Chairman of Heavy Electricals Ltd., Mr K. B. Mathur, has been in Britain this month inspecting the training of Indian technicians for the Bhopal plant. He is proceeding to Prague and Moscow, joined by Mr M. Hayath, chairman of the Central Water and Power Commission, and Dr D. B. Karlekar, senior industrial adviser to the Government of India. There, they will finalise arrangements for the setting up of two other heavy electrical projects under the Third Plan, in which Czechoslovakia and Russia have offered assistance. Both the projects are expected to go into production in three years' time. While the Indo-Soviet project will produce 0·75 million kW hydro and thermal generating units and high-power motors for the steel works, the projects with Czechoslovak collaboration will manufacture thermal units of 0·6 million kW capacity in addition to high-pressure boilers and associated equipment. The delegation is expected back in Delhi late next month.

Bhakra Generator Trial

A trial run on the first 90 MW generator at the Bhakra hydro-electric station was successfully completed on 16 Sept. Four further units are to be installed in the six-storeyed power house, the second unit in February, 1961.

600 MW Thermal Power Station

Plans for augmenting power supplies in the Durgapur and Calcutta regions were recently announced by the West Bengal Government. First phase of the scheme provides for building a 600 MW thermal power station, claimed to be the biggest in Asia, at Bandel. The unit will initially have 300 MW installed capacity at a cost of Rs 30 crores. Finance for this phase is expected to be obtained from the US development loan fund. In the second phase the station will be extended to 600 MW rating. It is anticipated that the scheme will be completed by the end of 1963.

Plans are also in hand to enlarge the existing Durgapur station. The capacity of the station is to be raised from 60 MW to 210 MW and foreign exchange to finance the scheme has already been secured by a loan of Rs 9·5 crores from the US development loan fund. The rupee part of the capital outlay, estimated at Rs 4·5 crores, will be advanced by the West Bengal Government. Consulting engineers for the Durgapur thermal enlargement scheme are the Kulijian Corporation of USA and an American and West German firm will complete the plant by the middle of 1963.

CANADA

Bridge River Completed

The British Columbia Electric Co. has now completed development of the full h.e. potential of the Bridge River, totalling 681,500 h.p. Two 230 kV transmission lines convey the output to Vancouver and southern Vancouver Island, and a third line, scheduled to operate at 360 kV ultimately, will be completed to Cheekye substation next year.

Grid Links Power Companies

Economies in capital plant and facilities for power interchange are features of the grid linking three Canadian undertakings in the Maritime provinces, brought into operation on 22 Sept. The grid links the Nova Scotia Light and Power Co. with the systems of the Nova Scotia and New Brunswick electric power commissions. The grid will make available a total spare capacity of 150 MW and will represent a saving of almost $20 million in capital costs to one of the participating utilities and possibly higher sums for the other utilities. The inter-provincial power grid was brought into operation at Onslow substation near Truro. Total cost of the new power pool is estimated at $4 million. Although a reserve of power will still be necessary, it will be reduced by about 20% and, largely because of the grid, completion of the Lequille and Alpena hydro developments is able to be postponed for at least a year. Operation will be controlled from Halifax, Fredericton and Trenton over a carrier current system.

MALAYA

Switchgear for Hydro Scheme

A switchgear contract valued at over £600,000 has been placed with AEI Switchgear Division, Willesden, by the Central Electricity Board of the Federation of Malaya. The switchgear order includes oil circuit-breakers for the first 132 kV substations in Malaya, which are to be sited at Jor power station and Rawang. It also includes 66 kV switchgear for a substation at Connaught Bridge. These three substations form part of the Cameron Highlands hydro-electric scheme and the consultants are Preece, Cardew and Rider.

AUSTRALIA

Vales Point Progress

Construction work on the New South Wales Vales Point thermal station is now well advanced. The station is 80 miles north of Sydney and is sited above vast coal deposits. The first 200 MW set is expected to come into operation in 1963 and the station will be completed by 1970.

Civil Hydro Contract

Approval of a £2 million contract for civil engineering work at the Barron River hydro-electric extension was announced recently. The contract covers diverting the Barron waters from below the falls through a horizontal inclined tunnel to an underground power station 940 ft below the falls. Transfield Qld. Pty will undertake the work. The Barron station will have two 30 MW water turbines and is scheduled for commissioning in 1963.

Sir Hamish D. MacLaren

I.E.E. PRESIDENT, SECTION AND

THIS week brings the opening of the 1960-61 session of the Institution of Electrical Engineers and, conforming with our usual practice, we set out below some background notes on the president and the chairmen of the various London sections and local centres. First the president, **Sir Hamish D. MacLaren,** K.B.E., C.B., D.F.C., B.SC.(ENG.), LL.D., M.I.E.E., will retire on 31 Oct. from the position of director of the Electrical Engineering Division of the Ship Department, Admiralty, which he has held since April, 1945. During his long and distinguished career with the Admiralty, Sir Hamish pioneered the introduction of a.c. supply and distribution in ships of the Royal Navy. He entered the Admiralty service in 1926 and, after a period with Royal dockyards at home and abroad, he was appointed to the Admiralty where he was responsible for drawing up the plans and specifications for the electrical installation in the naval base at Singapore, to which he was subsequently appointed as superintending electrical engineer. He returned to the Admiralty in 1940 as assistant director in charge of the Production branch of the Electrical Engineering Department and, on 1 April, 1945, he succeeded the late Sir James S. Pringle as director.

Dealing next with the London sections, the chairman of the Electronics and Communications Section is **Mr T. B. D. Terroni,** B.SC., A.C.G.I., D.I.C., M.I.E.E., manager and chief engineer of the Transmission Division of the Automatic Telephone and Electric Co. Ltd. Many members will recall his Faraday lecture on "Communications Through the Ages," which he delivered in 1954-55. Mr Terroni was with Ferranti Ltd. and the International Telephone and Telegraph Laboratories for three years before joining the ATE Co. in 1931, with whom he became assistant chief engineer in 1946 and manager and chief engineer in 1953. He was chairman of the IEE Mersey and North Wales Centre in 1948-49.

The Measurement and Control Section has as its chairman **Mr C. G. Garton,** F.INST.P., M.I.E.E., who has served on that Committee for some time. He has been head of the Materials Department of the Electrical Research Association since 1946, having originally joined that dept. in 1937. Before joining ERA in 1937 he was with the All-Union Electrotechnical Institute, Moscow, for four years. He served an apprenticeship with BTH at Rugby and from 1921 to 1924 was in the Test and Development Departments, followed by nine years in the firm's research laboratories.

Chairman of the Supply Section, **Mr J. E. L. Robinson,** M.SC., M.I.E.E., has been an executive director of Associated Engineering Ltd. since July, 1958, but prior to that he was manager of the Transformer Department of Ferranti Ltd. for nine years, following three years as departmental manager there. Born in Belfast he was educated at Queen's University and received his early training with Ferranti's, where he became a research engineer in the Transformer Dept. in 1931. During the war he served as a major in the RA and from 1942 was with the Directorates of Artillery and Signals and Radar Development, in which he rose to lieutenant-colonel.

Another representative of the manufacturing industry is chairman of the Utilisation Section, **Mr J. M. Ferguson,** B.SC.(ENG.), M.I.E.E., M.I.MECH.E., chief engineer at the English Electric Co.'s Stafford Works. Before taking up that position in 1953 he was a senior engineer in the company's Nelson Research Laboratories at Stafford, where he was responsible for the department concerned with the development of high power electrical apparatus.

Turning to the local centres, first in alphabetical order is **Mr R. B. Anderson,** M.I.MECH.E., M.I.E.E., chairman of the IEE Scottish Centre, who has been manager of the Dundee area of the North of Scotland Hydro-Electric Board since 1956. Earlier he was manager of the Board's northern area. He studied at the Royal College of Science and Technology, Glasgow, and, after a period with the Scottish Central Electric Power Co., joined the Grampian Electricity Supply Co. in 1933 as technical assistant and meter superintendent. After five years in that post he was promoted to distribution engineer and in 1947 became chief area engineer (transmission and distribution). From 1948 to 1951 he was distribution engineer and deputy manager of the North of Scotland H.E. Board's South Caledonia area.

The North Midland Centre chairman, **Mr F. W. Fletcher,** M.I.E.E., has been assistant chief engineer in charge of the Distribution Design (Substations) Section of the Yorkshire Electricity Board, at head office, since 1950. He has, in fact, served around Leeds throughout his career, gaining early training with the Yorkshire Switchgear and Engineering Co. and technical education at the College of Technology, Leeds. He then joined the Corporation Electricity Department in 1925, ultimately becoming deputy to the substation engineer; and on nationalisation of the industry he joined the YEB chief engineer's staff.

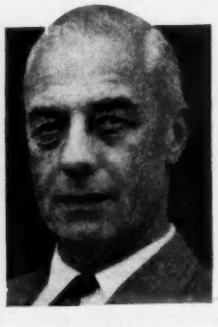
Representing the telephone service, **Lt-Col W. E. Gill,** T.D., M.I.E.E., telephone manager of the Peterborough area of the GPO, is chairman of the East Midland Centre. Educated at Rugby and Nottingham he began his departmental career in the Post Office Engineering Dept. in 1920. His service with that

Mr T. B. D. Terroni

Mr C. G. Garton

Mr J. E. L. Robinson

Mr J. M. Ferguson



Mr F. W. Fletcher

Department took him from inspector, Technical Section, N. Midland District, Nottingham, in 1930, to chief inspector in Coventry by 1936, and to assistant engineer, Glasgow telephone area, in 1938, being mobilised for war service in 1939. Returning to his civilian career, he was appointed area engineer at Chester in 1946, being responsible throughout Chester and N. Wales for planning and execution of works, a post which he held until transferring to his present position in Peterborough in 1952.

Another telephone engineer is chairman of the Southern Centre, **Mr R. Goford**, M.I.E.E., who is area engineer of the Portsmouth telephone area. Apart from a period during the war he, too, has served in the GPO throughout his career, which he started at Watford telephone exchange. He became a probationary inspector in 1934, serving in the N. Wales district and later in the N.W. area of the London Telephone Region. Subsequently, he became a probationary assistant engineer at Colchester and in the External Plant and Protection Branch of the engineer-in-chief's office of the Post Office. In 1941 he was seconded to the MoS Directorate of Hand Tools at Wolverhampton and, following a period as chief technical assistant in charge of the Directorate's Sheffield office, was in the Directorate of General Stores in London towards the end of the war, before returning to the Post Office, being at Brighton in 1949 and area engineer, Portsmouth, in 1950.

Lt-Col W. E. Gill

Mr R. Goford

Mr J. McA. Irons

CENTRE CHAIRMEN

The Northern Ireland Centre has a supply engineer as chairman, **Mr J. McA. Irons**, M.I.E.E., who has served with the Electricity Board for Northern Ireland since 1932, latterly as technical assistant (sales and development) at headquarters. He previously held positions of assistant district engineer, area manager at Dungannon, Lurgan and at Ballymena. An old Faraday Hse student, he received practical training with Crossley Brothers Ltd. and Londonderry Corporation Electricity Dept.

A third telephone engineer is chairman of the South Midland Centre, **Brig F. Jones**, C.B.E., E.R.D., M.SC., M.I.E.E., who has been telephone manager at Birmingham for the past 11 years. He, too, has continuously served with the GPO since joining the Engineering Dept. in 1922, except for war service. Prior to the war he was engaged entirely on engineering work, first on radio and later on general communications. After the war he took up duties as telephone manager at York.

Chairman of the North Western Centre, **Mr F. Linley**, A.M.C.T., M.I.E.E., is a member of the North Western Electricity Board in addition to being manager of the Board's No. 1 sub-area. The latter position he has held since February, 1954, and, prior to that, he was purchasing officer to the Board for some months. He entered the industry with Manchester Corporation undertaking, after experience with the Armstrong Whitworth and Crossley Motor companies. At Manchester he held various positions before being appointed chief assistant mains engineer in 1944. At nationalisation he became sub-area mains engineer for the N. Western Board's No. 1 sub-area.

The chairman of the Mersey and North Wales Section, **Mr D. A. Picken**, M.I.E.E., M.AM.I.E.E., M.INST.F., as HM Electrical Inspector of Factories, has been directly involved in the lengthy inquest proceedings arising from the disastrous Liverpool store fire, which were concluded last week (see page 536). He joined the Factory Inspectorate in 1945, after being electrical manager of the ICI, Billingham Division, during the difficult war years. He gained early training with the Walsall Corporation Electricity Dept. and after a period as consumers' engineer at Workington was technical and commercial assistant with the Morecambe and Heysham Electric Supply Dept. until 1939.

Mr A. C. Thirtle, A.M.I.C.E., A.M.I.E.E., M.NST.F., chairman of the Western Centre, has been director of the Southern, South Western and South Wales Region of the CEGB since its formation in January, 1958, following seven years as Controller of the South Western Division. He spent the early part of his career with the Norwich Corporation Electricity Dept., one of the most active municipal undertakings in the country, and ultimately held the position of generation engineer. There followed four years at Swansea as deputy city electrical engineer and manager, and in 1944 he went to Carlisle as city electrical engineer and manager. From 1948 to 1950 he was chief generation engineer (operation), Eastern Division.

Representing the technical education side, **Mr D. H. Thomas**, M.SC.TECH., B.SC.(ENG.), M.I.E.E., who is chairman of the North Eastern Centre, has been Head of the Department of Electrical Engineering at Rutherford College of Technology since 1947. In that period the Department has trebled its size and Mr Thomas has been largely responsible for the specification and layout of the new laboratories. He started with Metropolitan-Vickers and was on their research staff before going for a further year of post-graduate study and research under Prof Barkhausen, at Dresden. Returning to Britain he became lecturer in telecommunications at University College, Nottingham, in 1938.

Brig F. Jones

Mr F. Linley

Mr D. A. Picken

Mr A. C. Thirtle

Mr D. H. Thomas

Personalities *in the industry*

Mr D. St. C. Barrie

Mr T. W. Wilcox

Mr F. S. Barton

Dr S. English

Mr J. E. Flower

Mr J. O. Knowles, M.A., M.I.E.E., M.AM.I.E.E., a director of Metal Industries Ltd., is leader of a nine-man team of British industrialists who last week-end flew to Western Australia where they are to explore the opportunities to establish new industrial capacity. Their visit is scheduled to last ten days.

District commercial engineer at Warrington, Merseyside and North Wales Electricity Board for the past 11 years, **Mr D. St. C. Barrie,** A.M.I.E.E., A.M.B.I.M., has been appointed senior assistant to the commercial officer of the Board's No. 2 sub-area, as from 1 Oct. (*ESH, page 138). Educated at Portsmouth Grammar School and Southampton University College, Mr Barrie served with the Portsmouth Corporation Electricity Dept. from 1931 to 1938 when he joined the Fareham undertaking as meter engineer. After war service he joined the St. Helens Corporation as assistant consumers' engineer and, after vesting day, became sales and service superintendent for the Runcorn district of MANWEB.

Mr Alan Plumpton, district commercial engineer at Stockton on Tees to the North Eastern Electricity Board, has left England on a two-month exchange visit to the Detroit Light and Power Co., USA.

Merz and McLellan announce that they have taken into partnership, with effect from 1 Oct., **Mr T. W. Wilcox,** M.I.E.E., who has been a member of their staff since 1947. He will normally be at their Newcastle office, where he has been chief electrical engineer for the past eight years. Mr Wilcox, who was chairman of the IEE North Eastern Centre in 1957-58, has been an active member of a number of BSI Committees on switchgear and allied subjects. He commenced his engineering career with the BTH Co. at Willesden in 1930, and five years later became the first special switchgear trainee to have short circuit testing experience at the Switchgear Testing Co. Ltd., Trafford Pk. Returning to Willesden in 1936 he was appointed a switchgear design engineer and, in addition, was put in charge of several special switchgear investigations. The following year he became section leader in charge of all experimental and testing work on oil, air and air blast circuit-breakers, and for some years personally conducted all BTH testing at the Switchgear Testing Co., Manchester. At the end of the war he was section leader in charge of the design of all h.v. oil and air-blast c.b.s and was responsible for the c.b.s and ancillary plant in the 132 kV substation at Andover—the first of its kind in Britain.

Mr F. S. Barton, C.B.E., M.A., B.SC., M.I.E.E., has joined the board of Painton and Co. Ltd., Northampton. Until recently Mr Barton was the Counsellor on Defence Research and Supply in the United Kingdom High Commission in Ottawa. Prior to that he held a number of senior positions in the Ministry of Supply, including that of Director-General of Electronic Research and Development, while from 1941 to 1946 he was Director of Radio Engineering for the British Air Commission in the USA.

Honorary membership of the Illuminating Engineering Society has been conferred upon **Dr S. English,** D.SC., M.I.E.E., F.I.E.S., F.INST.P., chairman of Holophane Ltd., "in recognition of his valuable services to the Society and of his contributions to the science of lighting, particularly in the use of glass for the control of light, and in appreciation of his leadership in the national and international administration of lighting." Dr English was president of the IES in 1937-38 and led the British delegation at several meetings of the International Commission on Illumination. He joined Holophane Ltd. in 1927 as head of their research department; was appointed technical director in 1936, was deputy managing director from 1946 to 1949, joint managing director till 1955, vice-chairman 1955-57, and became chairman in 1957. He is a past-president of the Society of Glass Technology and a past-chairman of the National Illumination Committee.

Manager of the South Western Electricity Board's former South Cornwall district since 1948, **Mr J. E. Flower,** M.I.E.E., retired at the end of Sept. (*ESH, page 102.) Mr Flower was educated at Pembroke School, Lytham, Lancs, and later at the Manchester College of Technology. After early training as a pupil apprentice in mechanical engineering, Mr Flower joined the Lancashire Electric Power Co. in 1927; four years later he was appointed district engineer to the East Anglian Electric Supply Co. In 1937 he became resident engineer and manager of the Newmarket Electric Light Co. and he held this post until 1946 when he joined the St. Austell and District Electric Light and Power Co. in Cornwall as their chief engineer and manager.

Mr J. F. Mallabar, F.C.A., has joined the board and has been appointed chairman of Phoenix Telephone and Electric Holdings in place of **Mr G. F. Shipman,** who has become deputy chairman. Mr Mallabar is also a director of the Plessey Co. Ltd., one of the consortium of seven firms which was recently formed under the title of Combined Telephone Holdings Ltd. to acquire the Phoenix business.

The Minister of Power has reappointed the **Rt Hon Lord Citrine,** G.B.E., LL.D., COMP.I.E.E., as a part-time member of the Electricity Council.

The Plessey Co. Ltd. announce the resignation of **Mr E. J. Earnshaw** from the board of the parent company and also from the boards of the other companies within the group, of which he is a member.

Formerly station superintendent at Agecroft "A" power station, North West, Merseyside and North Wales Division, CEGB, **Mr A. H. Carroll,** A.M.INST.F., A.AM.I.E.E., has retired after 47 years in the industry.

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* *Denotes revision to the "Electricity Supply Handbook, 1960."*

Mr R. S. Glaister has been appointed customer liaison engineer to Panellit Ltd., a member company of the Elliott Automation Group.

Mr Eric Beeson, who heads discharge lamp development at AEI Lamp and Lighting Co. Ltd.'s Leicester headquarters, is on a month's visit to America to see new US lamp engineering developments and to present papers to the sixth international conference on lighthouses and navigational aids and the fifth international congress on high-speed photography. Mr Beeson's subjects at both conferences will include magnetic switching of discharge lamps and he will show a film on this subject, made in the company's Leicester laboratory.

Sir Richard Snedden has been elected to the board of the Superheater Co. Ltd. **Mr H. Melhuish** has retired from the board at his own request.

The names of the first Governors of the proposed Staff College for Technical Teachers has been announced by the Ministry of Education. The chairman is **Sir Alexander Fleck.** The other Governors now named include **Sir Willis Jackson,** F.R.S., PH.D., D.SC., M.I.E.E., M.I.MECH.E., director of research and education, Associated Electrical Industries Ltd.; **Dr J. S. Tait,** PH.D., M.I.E.E., M.I.MECH.E., principal, Northampton College of Advanced Technology; and **Mr W. F. Cartwright**, general manager of the Steel Co. of Wales.

Mr N. T. Canadine, the secretary of Barton and Sons, has been appointed to the board.

ECC (Moulded Breakers) Ltd. announce further additions to its outside sales staff. **Mr B. Granger-Bevan** is appointed sales engineer for South Wales and Bristol area; **Mr E. Powell** joins the company as Midland area sales manager, and **Mr K. Chapman** is appointed London area sales engineer. Mr Granger-Bevan served his electrical engineering apprenticeship in the South Wales Dock areas of the Great Western Railway. Having spent a short period in the Docks Engineer's office at Cardiff, he later joined the switchgear design staff of Whitehead Switchgear and Inventions Ltd. Since war service in the RAOC and REME he has been sales engineer with South Wales Switchgear Ltd. and their formerly associated company Treforest Electrical Services Ltd. Mr Powell, who will be located at Fordhouse Rd, Wolverhampton, was employed by Steatite and Porcelain Products Ltd. (ICI subsidiary) on production, and later technical sales of electrical porcelains from 1931 to 1939. He later joined the Revo Electric Co. Ltd. where he was manager of the Switchgear Production Department, and then sales manager for the Switchgear Division. Mr Chapman served his apprenticeship with the CLES Co. and since war service in the RAF he joined Messrs H. A. Sandford, consulting engineer, and later was with Simplex Electric Co. Ltd., as technical sales engineer from 1954 to 1958, when he joined F. W. Thorpe Ltd. as lighting engineer in the London area.

General manager of the Winnipeg City Hydro undertaking, **Mr T. E. Storey** has resigned from that position to take up the post of chief engineer of the Manitoba Power Commission with effect from 15 Oct. He has served with the Winnipeg undertaking since March, 1929, and has been general manager for the past five years. Mr Storey has resigned "with some reluctance and regret." It seems that Mr Storey was prepared to stay with Winnipeg City Hydro if he could be assured of security of position and pension. But it was found that the City could not legally give him any contract providing such security for any specific period. Mr Storey's concern for his future is believed to stem from the possibility that the Manitoba Power Commission may take over the City Hydro. The latter's current water lease rights for its Slave Falls plant expires in 1962. It also has an agreement in perpetuity for water rights at its other plant, Pointe du Bois, but if Slave Falls was taken over by the Commission, the City Hydro would probably not be able to carry on, according to Ald J. G. Harvey, chairman of the Personnel Committee.

President of the Illuminating Engineering Society for 1960-61, **Dr W. S. Stiles,** O.B.E., D.SC., F.R.S., a deputy chief scientific officer on the staff of the National Physical Laboratory, will give his Presidential address, entitled "Lighting and Research," on 11 Oct.

Mr P. L. Oliver, director, and **Mr Duncan Wright,** joint managing director of Hartley Baird, have been appointed directors of its subsidiary, H. J. Baldwin and Co; **Mr J. S. Addyman, Mr E. V. Byers, Mr F. Chambers, Mr J. R. Potts** and **Mr T. P. Summerton** have resigned from the board of Baldwin, but will continue with their executive duties. Appointments as directors of its subsidiaries are to be announced later.

Mr K. Lightfoot has relinquished the chairmanship of Lightfoot Refrigeration Ltd., and has been succeeded in that position by **Mr B. T. Aikman.**

Mr D. W. Payn has resigned his appointments as general manager and secretary of the Lead Development Association, with effect from Dec. 31 next.

Sir Kenneth Hague, chairman of Babcock and Wilcox Ltd., London, has been appointed chairman of Babcock and Wilcox of Africa (Pty.). He succeeds **Mr L. Egeland,** who has retired from that position, but will remain on the board.

Mr P. McKenna has been appointed marketing director, AEI-Gala Ltd.—AEI-Hotpoint's export organisation.

After 45 years' service with the Metallic Seamless Tube Co. Ltd., **Mr A. Jennens** has retired. Presentations were made to him by Mr Luther G. Hall on behalf of his colleagues. **Mr H. F. Henshaw** is succeeding him as the Birmingham area representative.

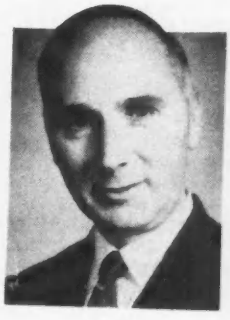
Mr S. P. Pritchard, M.I.E.E., has been appointed by A. Reyrolle and Co. Ltd. as area manager at their Nottingham office as from 1 Oct., but he will take up duties there at the beginning of Nov. He joined the firm at Hebburn in 1935 and was a member of the Contracts Department until 1948. From that time he has been with Kennedy and Donkin.

Mr D. W. Dean has been appointed district commercial engineer for the South Wales Electricity Board's Pontypridd and Caerphilly District. (*ESH, page 132.) Educated at King Edward VII Secondary School, Lytham, he entered the electricity supply industry in 1936. After holding appointments with the former Lancashire Electric Power Co. and the North Western Electricity Board, Mr Dean went to South Wales in 1956 to take up a post in the Commercial Department of the Board's Pontypool district, an appointment he now relinquishes to go to Pontypridd.

The Council of the Junior Institution of Engineers has awarded the Institution's Gold Medal to **Mr D. E. Edminson,** of Newcastle, for his paper, "Some Aspects of Industrial Space Heating," and the Vickers Medal and Prize to **Mr J. Heywood,** of London, for his paper, "The Design Features of Large Radio Telescopes."

S. O. Bowker Ltd. announce that **Mr W. M. Niven,** of 36 Craigmount Ave North, Edinburgh, has been appointed their sales representative for the whole of Scotland. In addition, **Mr R. D. Dent,** of 17 Oakhurst Gr, East Dulwich, S.E.22, has been appointed sales represen-

Mr E. Granger-Bevan



Mr E. Powell

Mr K. Chapman

tative for the northern section of London and the Home Counties. Mr Dent was previously with the Power Centre Co. and British Central Electrical Co.

Mr A. K. Craighead, secretary of Allied Ironfounders Ltd.; **Mr T. I. Hobart,** chairman and managing director, Bilston Foundries; **Mr T. L. Reed,** sales sales controller, Allied Ironfounders group; and **Mr G. E. Richards,** managing director, Leisure Kitchen Equipment, have been appointed directors of Allied Ironfounders.

Mr R. Lewis, who, since the nationalisation of the industry, has been Lincolnshire sub-area secretary of the East Midlands Electricity Board, retired on 30 Sept. after 46 years in the industry. (*ESH, page 114.) He began his career in 1914 on the staff of Lincoln Corporation electricity undertaking. A number of retirement gifts have been made to him by his colleagues.

Mr P. A. M. Curry, M.A., B.SC., M.B.A. (Harvard) has been appointed deputy to Mr H. St. A. Malleson, Head of the Government and Industrial Valve Division of Mullard Ltd.

London Transport Executive announces that **Mr S. G. Jones,** legal adviser, has been appointed secretary to the Executive with effect from 3 Oct. He succeeds Mr R. M. Robbins whose appointment as chief commercial and public relations officer we recently reported.

OBITUARY

Mr P. W. Tucker, M.I.E.E., formerly technical editor of *The Electrical Review*, died on 2 Oct., aged 65. He had served with our contemporary since 1925, initially as technical sub-editor.

Mr W. J. Chalk, B.A., who was in charge of the Frequency Allocations Section of the BBC Engineering Information Department, died on 24 Sept. aged 61.

Prof Bernard Hague, PH.D., D.SC., F.C.G.I., D.I.C., M.I.E.E., M.AM.I.E.E., who had held the James Watt Chair of Electrical Engineering at Glasgow University since 1946, died on 29 Sept. aged 67. He became a lecturer at the City and Guilds in 1920, following experience with Ferranti Ltd. and the RAE. He then held a lecturing appointment at Glasgow University before going to the Brooklyn Polytechnic Institute, New York, for a year, and returned to Glasgow in 1930 to be senior lecturer in the department of Electrical Engineering until his appointment as professor in 1946. Dr Hague was the author of several textbooks and numerous contributions to technical journals.

Lord Simon of Wythenshawe, president of Simon-Carves Ltd. and Henry Simon (Holdings) Ltd., died on 3 Oct., aged 80. During the last war he was a member of the Advisory Council for Fuel and Power, and from 1947 to 1952 served as chairman of the B3C. An authority on municipal and housing affairs—he served on Manchester City Council for many years—he was active in educational and other public affairs.

NEW LITERATURE

Electronic computers and their business applications

by A. J. Burton and R. G. Mills

ONE of the difficulties in introducing computer techniques into everyday business applications is, of course, capital cost. The other is to overcome the inherent distrust of the average business mind in a device, the working of which appears beyond his comprehension. Part of this psychological barrier may be due to the use of the word "computer" instead of "calculator," for the words are synonymous. Why should we have an "electronic computer" and a mechanical "calculator"? It may be argued that the mechanical calculating machine, so widely accepted in business today, is also a device the working of which is incomprehensible to the average user but he can, and does, trust the results he gets from it once he has learned to use it.

There are, of course, new problems in applying "computer" techniques to a particular business use, but they are quite easily solvable and the methods comparatively easy to acquire. In this volume the authors have attempted to make the application of computer techniques to business comprehensible to the average business man. Taking an imaginary design of computer, "CASSEAC," he first explains how it can be "tailored" to suit a particular application and the first steps in programming and staff instruction.

In the third part of the volume he deals with typical business applications which should be comprehensible once the early matter has been digested. At the end, the business man may still be hazy about how a computer works but he will appreciate how to apply it to his own problems and will be in a position to discuss them with computer experts intelligently. A useful book indeed. Published by Ernest Benn. Price 45s. 314 pages, 8½ in. by 5 in. 51 diagrams and 18 plates.

Working aluminium in shipyards

THIS is the second edition of the Aluminium Development Association's information bulletin 18, first published in 1951. Nine years between the two editions has seen a great advance in the use of aluminium in shipbuilding with corresponding progress in developments and applications. Although the title refers to aluminium alone, it is intended to cover alloys based on aluminium as well. Precautions to be taken in storing, identifying and handling are outlined as well as recommendations for working practices. A chapter on the behaviour of aluminium in contact with other metals is of vital significance and among the five appendixes is a schedule of alloys which are considered suitable for shipbuilding. Published by the Aluminium Development Association, second edition. Price 2s. 60 pages, 8½ in. by 5½ in. Paperboard covers.

Laplace Transforms for radio and electronic engineers

by W. D. Day, GRAD. I.E.E., A.M.BRIT.I.R.E.

WHEN Laplace originally began his investigations on an infinite integral nearly 150 years ago he could have had little idea that here, in the mid-twentieth century, his work would be of such interest and value to electrical and radio engineers as to justify the publication of a number of books on the subject. Some credit must, however, go to Heaviside who, a century after Laplace, revived interest with his operational calculus, but, whatever the reason, the Laplace Transform is now of such importance that it is beginning to feature widely in Higher National Certificate syllabuses. The author has here endeavoured to show, in language with which the average engineering student is familiar, what is meant by a Laplace Transform and how it can profitably be applied to electrical problems. Let us admit that it is not light reading by any show of imagination. It needs careful and concentrated study but the result will be rewarding. The author knows his subject and has had the co-operation of his students in that they have acted as "guinea pigs" for his first drafts. Published by Iliffe and Sons. Price 32s 6d. 179 pages, 8½ in. by 5½ in.

Progress in plastics 1959

edited by Philip Morgan, M.A.

THIS is a record of papers read before the International Plastics Convention at Olympia in 1959. It contains some useful up-to-date information on the newer plastics materials, notably polypropylene and the latest epoxides. Progress in glass fibre reinforced plastics both at home and abroad is also summarised in papers by Tunteler, Kraft, Parkyn and Blankmeyer and there is an interesting description of foamed smokes and their uses by Betty Lou Raskin. Final papers cover extrusion studies on thermoplastics. Published by Iliffe and Sons. Price 55s. 216 pages, 9½ in. by 6 in., with diagrams and plates.

BOOKS RECEIVED

Applied Boolean Algebra, by F. E. Hohn. Text-book for both mathematicians and engineers pitched on sixth-form mathematical level. Published by Macmillan and Co., New York, 139 pages, 9¼ in. by 5¼ in. Price 17s 6d.

Magnetism and Electromagnetism, by A. Schure. An elementary study. Published by Chapman and Hall, 168 pages, 8½ in. by 5½ in. Price 37s 6d.

Experimental Plastics, by C. A. Redfarn and J. Bedford. Text-book for practical work for Plastics Institute examination. Published by Iliffe and Sons Ltd., 140 pages, 8½ in. by 5½ in. Price 22s 6d.

Low Frequency Amplifiers, by A. Schure. Outline for amplifiers for up to 100 kc/s. Published by Chapman and Hall, 150 pages, 8½ in. by 5½ in. Price 32s.

Relativity for Engineers and Science Teachers, by L. H. A. Carr. Presents special theory and relativity in form suitable for average engineer or engineering student. Published by Macdonald and Co., 52 pages, 7¼ in. by 4¼ in. Price 12s 6d.

From m.c.b. to 800 A

PRODUCTION STARTS AT E.C.C's NEW FACTORY

SWINGING into production is the new E.C.C. (Moulded Breakers) Ltd., works at Wolverhampton, which was officially opened last week. Four ranges of breakers are made with current ratings extending from 5 A to 800 A. One characteristic of these breakers is the housing in phenolic moulded cases and they are all designed for use either singly or assembled into multiple panels for building into boards of any layout to meet users' requirements. For the start-up of this factory component parts were temporarily imported from the associated company, Federal Pacific Electric Co. of New Jersey. This has allowed production to be achieved while tooling up is in process. At the present time the steel cases and sub-assemblies are made in the factory, which is of modern design with ample room for expansion in production.

The smallest range made is the "Stab-lok" miniature circuit-breaker, available in ranges from 5 A to 60 A. The design originated in the USA and over 75 million of these units are said to have been sold. The name originates from the special contact which enables a circuit-breaker to be plugged into the busbar. Units are arranged on either side of the busbar thus providing a compact, flexible arrangement, ideal for distribution boards. The circuit-breaker is factory sealed and the thermal overload and magnetic trips are factory set and tested. Each tripping mechanism is separately calibrated and subsequently tested to within fixed limits at twice full rating. Subsequently sample testing provides a general check on all manufacturing tolerances.

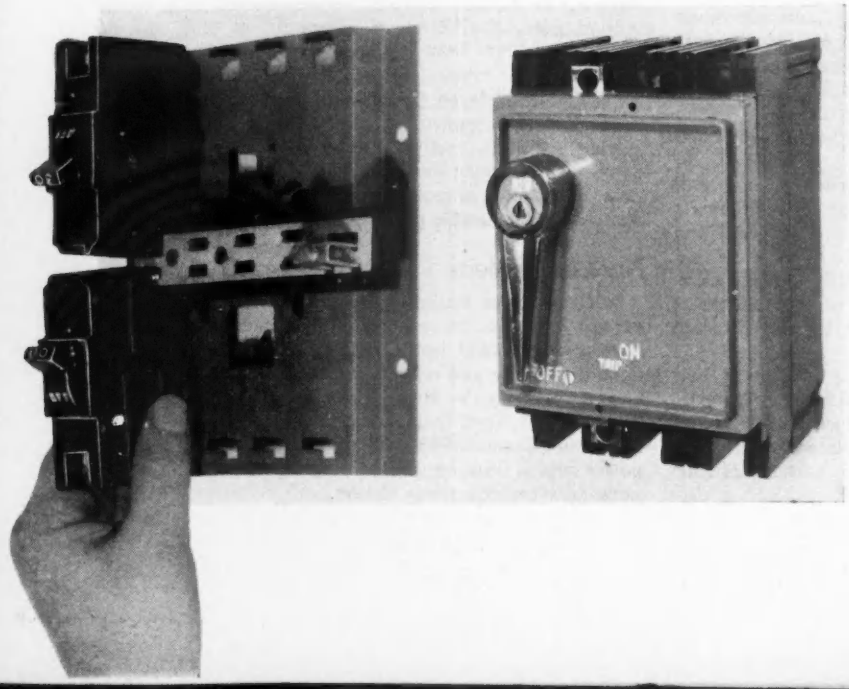
For the three ranges of higher ratings there is a common feature in the rotary handle which rotates through 45° or 90°. This has the advantage of providing an intermediate trip position which clearly shows when the breaker has tripped. A simple cam arrangement is also in the handle which can be arranged to operate interlocks on the cover of an enclosure. In addition a rim round the base of the handle can be raised and with the use of a padlock the switch can be locked in either the open or closed position.

The smallest of these three types of circuit-breakers has a range of 15 A to 100 A at 400 V a.c. or 125 V to 200 V d.c. This, like the "Stab-lok," is a factory sealed unit in which the trip settings are calibrated in a temperature controlled room. The single pole units can be readily built up into double or triple pole circuit-breakers and these breakers built into control panels as may be required. For the connection of the busbar of these units, both a clamp terminal, which the makers recommend, and a connection for a sweated lug are provided. It is stated that the single-pole units of this circuit-breaker have passed short-circuit tests at 9,000 A at 250 V a.c.

For heavier duty, a range is offered with capacities from 70 A to 400 A at 600 V a.c. designed with the usual contacts of silver alloy and corrosion resistant bearings. A heavier range provides for capacities from 125 A to 800 A at 600 V and is the largest rating produced in this factory. It follows the same basic principles of the smaller breakers, but in this case an interchangeable tripping unit is provided which can, if desired, be replaced on site by one of a different current rating. In addition the magnetic trip is adjustable in this and in the 400 A breaker but in all of the four ranges the thermal overload trip is factory calibrated and sealed and is not adjustable on site. Tripping characteristic curves are supplied.

All these units can be combined in any arrangement required. The smaller units are mounted on a sub-frame suitable for mounting within a suitable panel. Advantage has been taken of the flexibility of rating of the "Stab-lok" miniature breaker to produce a range of consumer control units of competitive price. These are available with from four to twelve ways with breakers of any desired rating combination. In addition a consumer's unit arranged for a separate off-peak circuit is supplied.

These new ranges of circuit-breakers have proved their flexibility in meeting users' requirements under differing types of industry. It is planned to build all types for stocks so that a 24 hours' service will be available at all the company's distributing centres. These circuit-breakers have already proved their design in service and are an important addition to an essentially competitive section of the industry.



Left. Small breaker showing "Stab-lok" principle of busbar connection

Right. Rotary type handle used for breakers up to 800 amp, with centre trip position

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Russia's supply programme

CANADIAN ENGINEERS IMPRESSED BY ORGANISATION

CANADIAN power supply engineers who visited the USSR in May found that Russian engineering and construction of power installations, apart from the relatively unimportant factor of finish, was "outstanding" in the field of e.h.v. transmission and hydro generation. Manufacturing of power equipment generally was good, but achievements in the field of thermal and nuclear power generation were not particularly impressive.

These opinions are set out in a report on the visit, prepared by two engineers of the Hydro-Electric Power Commission of Ontario who took part. The report includes a valuable translation of a lecture on the main aspects of electric power development in the USSR, delivered to the visiting delegation by a Mr N. Bondarev, who is described as chairman of Planning and Production at the Ministry of Power Station Construction.

Planning

Development of the Russian power system seems to be guided by two plans. One is a 20-year general plan, the other a more specific seven-year plan; the current one covers a period ending in 1965. Planning policy seems based on securing maximum capacity increase in given time, with other factors, such as attaining lowest overall cost of energy, considered of secondary importance. This policy is behind the preference being given to thermal stations at present, despite the large unharnessed hydro potential of the country.

The target for 1965 is 113,000 MW installed capacity, 90,400 MW thermal and 22,600 MW hydro. This involves commissioning an extra 43,880 MW of thermal plant and 9,800 MW of hydro plant, compared with the end of 1959. By the end of 1965, hydro should be providing 20% of the annual generation of 500 x 10^9 kWh.

Large-capacity power stations are the basis of policy at present. Capacities are up to 6,000 MW hydro and 2,400 MW thermal, and individual generating units are sized accordingly, up to 500 MW hydro and 300 MW single-shaft thermal units and possibly 800 MW two-shaft. Accompanying this generating plan is a corresponding scheme for extending transmission, with 6,600 miles of 500 kV line featuring in the seven-year programme, together with 4,000 miles at 300 kV and 19,000 at 220 kV.

On the transmission side, two networks are involved. One is the European grid, based on three 400 kV circuits inter-connecting the Volga, Moscow and the Urals. The other network is an Asian grid, still to be built, a 500 kV scheme in the Bratsk-Irkutsk area, north of Mongolia. There are long-term plans for extension of both networks, and for their eventual interconnection by long-distance d.c. transmission lines.

In considering Russian engineering designs, their economic basis has to be kept in mind. Although depreciation is charged, there is no interest charged on the capital required; schemes are financed out of state revenues. On this basis, thermal power at h.v. busbars cost about four times as much as hydro power.

Maximum capacity of post-war plants at present operating is 600 MW, using mostly 100 MW sets, though with some recent additions at 150 MW. Production in factories was designed to produce sets and boilers of these ratings at what the report calls moderate steam conditions. Recently, with a new accent placed on fossil-fuel-fired stations, there has been increased activity in design for thermal plant, and 300 MW machines are in production.

In addition to the sets being built, designs are in hand for 500, 600 and 800 MW units. Steam conditions are also being advanced rapidly. More detailed discussion of steam sets is given later in this article.

Much use of precast concrete and prestressed concrete was noticed at power stations, with very little structural steel in use. Even turbine blocks for large sets are to be built from precast concrete. The report observes that general design, housekeeping and construction at the stations seen operating was not impressive, but that Russian engineers indicated that many improvements would be evident in new stations.

Hydro Stations

Russian hydro development is made more difficult by relatively unfavourable geographical conditions. Substantial settlement of structures is designed for, apparently without ill effects. Constructional methods are based on maximum use of mechanisation and seemed very efficient to the Canadian delegation. At a site with an average temperature of −11°F, concrete was poured for nine months of the year. However, a low standard of construction was found in many places.

115 MW Kaplan units are in operation, and 225 MW Francis types are being built. 500 MW sets are at the design stage. Kaplan units are used exclusively for low-head installations. No fixed-blade propellor units are produced in Russia. Transport is seen as the main factor limiting units size; Russian engineers say they see no reason why 1,000 MW units cannot be produced in the "not too distant future."

Excitation of large units is supplied by mercury arc rectifiers. The argument is that these provide fast and reliable operation and give good performance from the stability aspect when long transmission lines are being fed. Cost of rectifiers is reckoned to be less than for rotating exciters of comparable performance.

Nuclear Stations

Nuclear power stations play only a minor part in the current USSR seven-year plan. The general view is that nuclear energy will not compete economically for some time, that safety and reliability characteristics are not well known. Nor do the Russians consider that they have a good, reliable fuel. Only when one is available will construction be accelerated. The present nuclear effort in the power field is directed to obtaining experience with a wide range of types of nuclear station.

The general impression of the Canadians is that Russia is taking a realistic, down-to-earth view of nuclear power, considering conditions in the USSR, and that the engineering is, if anything, conservative.

Transmission

Conservative is not suggested as an epithet for the work in the transmission field. Currently, this is moving into use of 500 kV. There is one d.c. line operating, a 30 MW 200 kV line 70 miles long, used for experimental work. A 300 mile long 750 MW, 800 kV line from Stalingrad to the Don Basin is scheduled for operation in 1961-62, but in view of the publicity this has received, it is particularly interesting to note the Canadian statement that this will not be considered to have high reliability and is supported by a.c. lines. It is clearly intended to give experience of d.c. transmission technology.

Although 500 kV will remain the highest voltage used in transmission for some time, the 20-year plan envisages 1,000 kV, a.c. and d.c.

500 kV construction seen at Stalingrad involved three-conductor bundles using 480 sq mm ACSR conductors. The bundle spacing is 40 cm, with between 11 and 12 metres between phases. Two 21-unit strain insulators are used per phase, and the towers are of steel construction.

500 kVA air blast circuit-breakers are rated at 15,000 MVA using six interrupters and with air at 290 lb/sq in.

One of the transmission design developments is a series of prefabricated, prestressed spun concrete guyed towers for future lines up to 500 kV. Total weight of steel per tower is kept down to 2·1 tons, including guys. A feature is use of release clamps for conductors when longitudinal load exceeds 2½ tons per phase.

Design of systems for transient stability is based on single-line to ground faults of not more than 0·1 seconds duration. The Russians claim that constant voltage behind transient reactance can be maintained with their standard voltage regulating equipment, while with electronic high speed regulation, low-reactance generators are not required.

Thermal Details

Detail of Russian work in thermal power station design becomes apparent in the brief reports of visits to specific power stations. For example, the Cherepetsk station, about 120 miles south east of Moscow, has four 150 MW sets. The boilers are fired with brown coal of 3,960 B.Th.U./lb calorific value, 40% ash. Steam conditions at t.s.v. are 1,022°F, 2,750 lb/sq in. with reheat to 968°F for the first two units, about 50° higher in temperature for the second two. There are two natural circulation boilers for each set. Sets have single flow h.p. and i.p. cylinders and double flow l.p. with Baumann exhausts. The generators are hydrogen cooled. More than one quarter of the station staff of 500 (excluding maintenance staff) are women. It is intended that two 300 MW sets working at 3,530 lb/sq in., 1,075°F will be commissioned by the end of 1967.

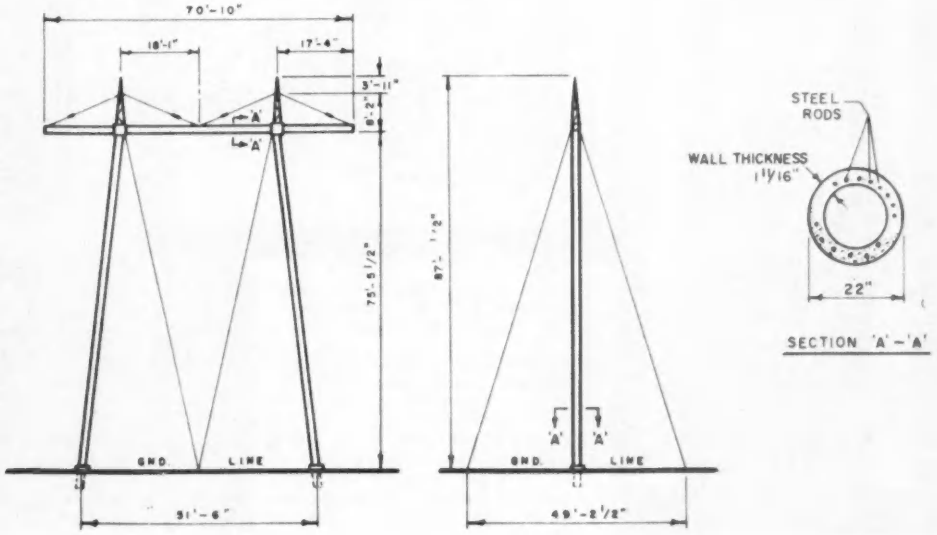
At the Staro-Beshevsk station near Stalino in the Don Basin, three 100 MW sets are in commission, and six 200 MW sets are planned for installation. Coal of 12,600 B.Th.U./lb, 20% ash is available. There are two boilers/set at present, with steam conditions 1,470 lb/sq in., 1,005°F with reheat to the same temperature. Steam conditions for the 200 MW sets will be 2,060 lb/sq in., 1,060°F, with reheat to the same temperature. There are 120 operators for the first three units; stations throughout the whole area are serviced by a large central maintenance staff.

Design details for the 300 MW sets were obtained at the Kharkov Turbine Works, which has a capacity of 2,000 MW/year in steam turbines and also makes hydro and gas turbines. Steam conditions for the 300 MW design are 3,525 lb/sq in., 1,077°F with reheat to 1,050°F. There is a single flow h.p. and i.p. cylinder and three-flow l.p. Last row blading is 39 in. long, and is designed for 8% moisture content steam (centrifugal force, 220 tons/blade). No austenitic steels are used in the design. The rotors are solid. Generators are water cooled.

Prototype development is in hand for steam conditions of 4,400 lb/sq in., 1,200°F. Designs for 500, 600 and 800 MW sets are in preparation, the first for 1962 delivery, the others for 1963. Short schedules are claimed; 22 months for design and production of the 300 MW unit. The works say there is intention to test a water-operated governor for use with steam turbines, to eliminate fire hazard associated with oil.

At the Leningrad Metal Works, a 300 MW 3,530 lb/sq in. 1,077°F set with 7,270 B.Th.U./lb heat rate is to be completed this year. A tandem 500 MW set is being designed, and a cross-compound 1,000 MW unit, but the intention is to wait for progress by boiler manufacturers before constructing such sets. Water-cooled stators have been built since 1957.

Use of concrete wherever possible to economise in steel is one of the characteristics of supply engineering in the USSR. This design is for a 500 kV a.c. line, and uses prefabricated prestressed spun-concrete structures in the form of guyed towers. There is between 6 cu yd and 6·7 cu yd concrete in each structure, and 2·1 ton of steel, including guys. Wall thickness of the spun concrete is 1·6 in to 2 in. Release clamps are used for the conductors, permitting them to slip when the longitudinal load becomes excessive



equipment for industry

Distance measurement protection

INTENDED for rapid discriminative clearance of faulty feeders on complex 11 kV and 33 kV networks, a new low cost phase fault protection system has been introduced. This is an alternative choice where an inverse-time overcurrent system is inadequate. Its operation depends on fault distance measurement by means of a single admittance (mho) relay in conjunction with instantaneous overcurrent relays. Three zones of distance measurement are permitted by the mho relay and by employing a timing unit the ranges are successively varied from zones 1 to 3. Operating time for zone 1 is approximately 0·1 sec. Known as the SSM3V system, the main equipment is housed in a case measuring 20 in. by 6 in. by 6 in. *The English Electric Co. Ltd., Marconi Hse, Strand, W.C.2.*

Contemporary-styled panel meters

FOUR models of a range of contemporary-styled panel meters are announced. These incorporate open scales to give shadowless readings, mirror or other special scales being available to order. Nominal scale lengths are from 1½ in. to 4½ in. Currents in the range 10 mA to 5 A a.c. or d.c. are catered for by rectifier or thermocouple meter types in this "Vista" range, having moving-coil centre pole movements. For the range 10 mA to 50 A, moving-iron movements are employed. Voltmeters are available for 10 V upwards. Accuracy of measurement is said to be 1% f.s.d.

Also announced is a valve tester capable of handling a range of 5,000 valves covering British, American and continental types. It has 21 valve holders and facilities are provided for testing both earlier valve types and the latest TV and 12 V car radio valves. This instrument, 45C, measures mutual conductance up to 15 mA/V with sufficient accuracy, it is claimed, to permit of valve "matching." *Taylor Electrical Instruments Ltd., Montrose Ave, Slough, Bucks.*

Self-healing miniature capacitor

VACUUM coating poly-terepthalic acid dielectric with aluminium enables production of an exceedingly compact capacitor occupying only 50% of the space taken up by an equivalent paper tubular type. A valuable property of the dielectric used is its self-healing effect after puncture. This is the WIMA "Tropyfol" which is offered in 125 V and 400 V ratings. The capacitor is encapsulated in moisture-proof plastic resin and an operating temperature range of between −55°C and 100°C is claimed with a maximum of 125°C short time. Contacts are sprayed to the end faces of the coiled element to give low inductance and good H.F. contact. With the continuous quest for miniaturisation, this capacitor has obvious applications in the electronic industry. *Waycom Ltd., Empire Bldgs, Duke St Hill, S.E.1.*

Plug-in time switch

SUITABLE for under-floor and block-storage electric heating the BP range of 30 A plug-in time switches can be set to give a wide range of switching cycles. A typical switch can be set to cater for a whole year if so required, switching loads in or out for specified days, week-ends or even longer periods. *Venner Ltd., Kingston By-pass, New Malden, Surrey.*

Improved lighting control unit

THE original series ALC.3 photo-cell lighting control unit produced by Lancashire Dynamo, has been redesigned to give improved performance at lower cost. The new unit, intended for switching any form of lighting in streets, factories, shops, etc., is narrowly sensitive to vertical north-light to avoid interference from artificial lights. It is weather-proofed by means of a neoprene seal and the window is of moulded glass to inhibit accumulation of dust or snow. *Lancashire Dynamo Electronic Products Ltd., Rugeley, Staffs.*

Portable searchlight unit

A PORTABLE searchlight unit has been devised to assist in rescue operations and other emergencies. Power is supplied to a handlamp from a lightweight silver/zinc accumulator in a carrying case. The combination is claimed to provide a good working light for one to two hours. The handlamp can be spiked into the ground or clipped to a convenient structure. *Venner Accumulators Ltd., Kingston By-pass, New Malden, Surrey.*

Wide range valve tester by Taylor Instruments, Model 45C, complete with c.r. tube test adaptor

English Electric distance protection equipment incorporating relays and timing unit

Venner plug-in time switch for controlling electrical storage heating loads and, below, portable searchlight unit comprising handlamp, lightweight accumulator and accessories

for the electrical trade

Simplifying the wash-dry cycle

SIMPLE control of the increasingly complicated wash-drying operation is a feature of the "Polymatic" tandem laundry machine. Recently introduced from West Germany, this combination machine is equipped with individual pumps and motors for the two tubs. Control, however, is made easy by the use of push-buttons and a rotary switch. These controls and a pilot light are arranged in an effective yet unconfusing group in a decorative triangular panel of pale blue on the front of the white stove enamel casing. The dial controls timing of the agitator action and the pumps, whilst three buttons cover heater, spin dryer and switching off. The spin dryer and its pump function together automatically.

Total rating of this combination is somewhere in excess of 2,300 kW, 2 kW of this representing the heater rating. "Polymatic" has all the finer points expected in the luxury class to which it belongs—sediment trap, accessories for handling clothes, hook-on draining pipes, working table-top and swivel castors. Capacity is 5 lb washer and 6 lb dryer. Price £86 18s 9d. *Polymatic Domestic Appliances, Cater Bldgs, 1 Cater St, Bradford.*

Swedish units fits any kitchen

A WIDE selection of domestic kitchen units is to be marketed here by the adventurous Swedish firm, Electrohelios. Included in the enterprise are built-in units, small-scale appliances for the flat or bedsitter, and a few luxury class items.

In the first category are three counter-top cookers designed for flush mounting alongside existing fittings. They employ "Quickplates," heating plates made of extra-thin material, claimed to have an exceptionally short heating-up time and good response to changes in switch settings. Two of these built-in units are double-plate models, at £15 10s and £14 10s; the other has three plates and is priced £20. Also designed for building-in are four refrigerators. Known as "King Cold," they range from a 1·8 cu ft model at £47 6s 3d tax paid to a 4·3 cu ft model at £74 10s 4d.

For use in the smallest living quarters are two handy cooking units, single- and double-plate table cookers, also incorporating "Quickplates." They have white vitreous enamel tops with blue plastics switches and handles and are priced £6 6s and £9 9s. A multi-purpose heating jug of three-pint capacity is also in this space-saving range, selling at £4 12s tax paid.

The one full-scale cooker in this selection is the £70 "Electrohelios Luxury Cooker," Model S. 21, again embodying four "Quickplates," in this case with an increased loading and fitted with "Helistat" safety cut-outs. There is no separate grill and no splash-plate. The oven, fitted with a glass door and interior light, provides for the installation of a rotary spit, costing £7 1s 11d extra. A large storage chamber and plate-warming compartment are included. Also in the luxury class are "Helifrost" home freezers, chest-type cabinets said to maintain a temperature of 0°F. They incorporate British-made "Tecumseh" compressor units and sell at well over £100. UK agents: *Helimatic, 22 Buckingham Palace Rd, S.W.1.*

TRADE PUBLICATIONS

LINOLITE.—1960-61 catalogue and price list of light fittings, strip reflectors and signs. Linolite Ltd., 11 Baker St, W.1.

METWAY.—56-page catalogue MYP/4 with prices of replacement elements and spirals from Metway Electrical Industries, Metway Works, Canning St, Kemp Town, Brighton.

NU-SWIFT.—Folder on applications of portable fire extinguishers. Nu-Swift Ltd., Fire Protection Centre, 25 Piccadilly, W.1.

HELLERMANN.—30-page illustrated brochure of compression terminals and tools from Hellermann Ltd., Crawley, Sussex.

OSPREY.—Leaflet on a sodium tube lantern for Group A and A1 lighting from Siemens-Ediswan, A.E.I. Lamp and Lighting Dept., 38 Upper Thames St, E.C.4.

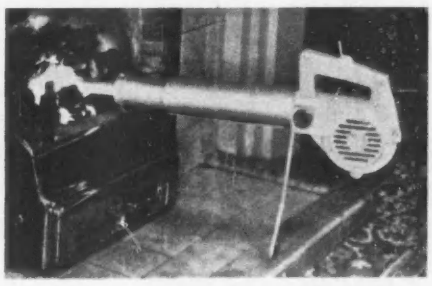
CRYSELCO.—38-page price list booklet in colour describing lamps and fittings by Cryselco Ltd., Kempston Wks, Bedford.

Out-doing the gas poker

A BLAST of hot air from the new GEC domestic fire lighter ignites most solid fuels within a few minutes. There is no question about its superiority over the tried method of wood and paper; moreover, it is far cheaper to run and quicker than a gas lighter or poker. Obviously it will find its greatest market where a solid fuel fire is preferred and where provision for gas lighting is not already installed.

In appearance it is rather like a gun, with a rounded butt which contains a fan and motor unit. Air is forced down the "barrel" through a ceramic tube threaded with an 1,800 W element arranged to form 24 small coils, down the centre. The space between this tube and the outer casing also receives a strong air flow, thus preventing heat loss as well as ensuring a cool surface. The air is ejected at a temperature of 800°C, but disperses quickly and a few inches beyond the outlet only a warm flow is felt. The gun is placed with its nozzle buried in the fuel and supported at the handle end by a stand of tubular steel. Coal blazes within a few minutes, smokeless fuels in as little as 6 min and coke nuts in about 13 min. Once the fuel is alight the element may be switched off, allowing the fan to act as a bellows.

GEC are well aware that the spacegun-like appearance of this appliance will attract children and have guarded against accidents by incorporating a locking switch. To activate the element a specially designed lever must be inserted into the switch mechanism on the top of the handle. When pushed over into the "on" position this lever cannot be removed. It has been pointed out that the fire lighter costs less to run than the price of matches and, taken over a year or so, this saving and the elimination of wood costs should offset the original outlay, which will not be much more than £5. *General Electric Co., Magnet Hse, Kingsway, W.C.2.*



G.E.C's hot air fire lighter ignites coal in a few minutes. It will sell at about £5

Spin dryer price drop

ANOTHER spin dryer to be reduced in price is the "Pirouette," which sells at £23 2s tax paid from 3 Oct. This represents a drop of £5 5s. *Parkinson Cowan Appliances, Stechford, Birmingham 33.*

Twice-as-bright flash bulbs

THE new "Tru-Flash" range of flash bulbs includes one which gives twice as much light, but costs no more than the others. Atlas, announcing the introduction of the range for 1 Oct., state that their new bulb will enable the photographer using colour film to get more in his picture, use faster shutter speeds, or smaller apertures. Known as "Double-lite Blue" it will be available in six-bulb packs instead of the usual five and displayed together with Types 1 and 5 in new compact counter dispensers. There is also a new showcard available with a pocket designed to take a "Photoflash" coloured booklet. *Atlas Lighting Ltd., Thorn Hse, Upper St. Martin's La, W.C.2.*

Display for lighting sales

LONDON'S LATEST LIGHTING SHOWROOMS

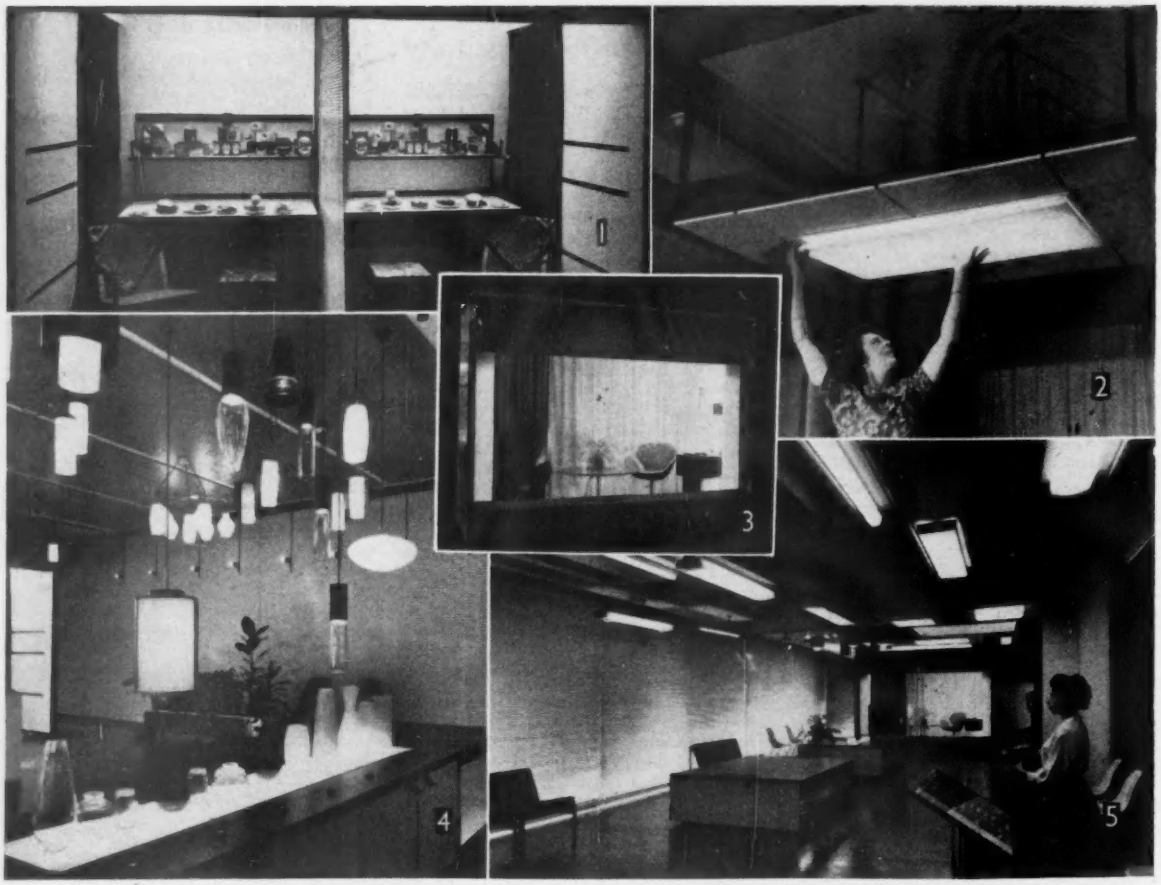
LATEST lighting showrooms in London were completed recently at Thorn House, headquarters of Atlas Lighting Ltd. Altogether an area of 1,800 sq ft is made available for lighting equipment demonstrations, and the full possibilities of décor and control have been called into use to make the best of this space.

Centrepiece of the showroom area is a shop window which illustrates an up-to-date lighting display with the Atlas "Aurama" system (as used for Son et Lumiere) installed in miniature form to deliver a short lecture on display lighting.

The main range of industrial and commercial lighting fittings is concealed in ceiling coves, each fitting being mounted on a motorised lift panel. A floor-mounted console contains photographs and control numbers of all the fittings, and the appropriate number dialled on a telephone type control brings the fitting selected to a convenient height and lights it. Several fittings may be lowered together to permit close comparison; a single master switch returns all lowered fittings to the ceiling at the end of a demonstration.

Colour-rendering properties of lighting are of course of great importance in shops and stores, and a full-scale colour comparator, consisting of two small rooms divided centrally by a venetian blind, enables the effects of various colours of fluorescent tubes to be compared.

Apart from the usual lighting on show, there is a small display demonstrating industrial and commercial applications of the ultra-violet tube; and architects and engineers may be helped by a demonstration of differing light outputs given by different fluorescent tubes against various backgrounds.



1. The two-section colour comparator; 2. A false ceiling section which can be brought to lower level to demonstrate a recessed troffer fluorescent fitting; 3. The display "window" which is accompanied by a talk on display lighting; 4. Glasses and suspensions from the "Chelsea" and "Finlandia" ranges; 5. Using the telephone dial to bring down a lighting fitting for demonstrations

News of the Week

TWO BOARDS RAISE TARIFFS

10% in South Wales : 5% in South East

SHARP confirmation for Sir Robertson King's forecast that electricity tariffs will have to rise comes from two electricity boards this week. Announcements followed urgently on the publication of their annual reports and it is expected that other area boards will follow, some chairmen having already given warnings. The South Wales EB announce that from the beginning of October prices of domestic and commercial units will have their primary rate raised from 5½d to 6d and this price will have to be paid on a higher consumption of 13 units per room instead of 12 units per room under the existing tariff. The final domestic rate for electricity, at present 1d, will be raised to 1·1d.

A similar increase will also take place in the commercial block rate, with the primary units going up from 5½d to 6d and the final rate to 1·1d. The floor area basis of the primary block will not be changed. A new farming tariff is also introduced of a three-block type in which the first 65 units per quarter will be charged at 6d, the next 65 units at 3d and the final price 1·1d.

These increases should bring in approximately an additional £1 million, in a full year. For the current year the new rates in general will apply only to billing after 1 Jan.

The Board point out that the need to raise prices was forecast early in 1959 and the recent increases in the price of coal and in salaries and wages has made these tariff revisions urgent. In the Board's accounts for the year 1959-60 a surplus of £555,172 was recorded, but it is pointed out that the Board is self-financing its capital requirements to the extent of 44% only. A higher level of self-financing is needed if a 48% ratio is to obtain for the industry as a whole. These tariff increases have received the approval of the South Wales Electricity Consultative Council.

Seeboard's Increase

INCREASED tariffs announced by the South Eastern Electricity Board operative from 31 Oct. do not cover the latest coal price increase, the Board states. In the domestic tariff, quarterly charges are raised 2s 6d and the unit rate from 1·2d to 1·25d. The latter unit price increase also applies to the farm and installed load tariffs.

On the brighter side the two existing off-peak rates of 0·9d and 1d p.u. are replaced from 1 Nov. by three rates of 0·85d, 0·95d and 1d p.u., with consumers on the latter figure also having the advantage of an afternoon boost for their night-storage heating. The Board is also reducing by an average of 12½% its charges to local authorities for street lighting maintenance.

Eire also Raises Tariffs

DEFICITS for three years running, rising to £430.000 in the last year, has forced the Eire Electricity Supply Board to revise its charges. Rural electrification is blamed for the loss which has been growing with the number of areas supplied and the loss would continue to grow until the present programme finished.

The new increases will provide about 5% additional revenue. The actual changes are of considerable complexity and cover most tariffs. Two-part tariffs will have increased fixed charges of 6d to 1s per month and, while the primary rate of block tariffs is left unaltered, the final price per unit will be raised from 1·1d to 1·2d. The cost of commercial lighting and industrial power will also be increased but there will be no rise for water heating, commercial cooking or industrial process heating. Off-peak tariffs are unchanged.

Expanding Overseas Interests

THE Electrical Apparatus Co. Ltd. have established a subsidiary, Electrical Apparatus Co. (South Africa) (Pty) Ltd. with stock and sales/service facilities, at 38 Mewett St, Ophirton, Johannesburg.

THE directors of Midland Electric Manufacturing Co. Ltd. have acquired an interest in Pritchett Pty Ltd., of Sydney, NSW, Australia, switchgear manufacturers. Mr J. Thornell, who represented MEM in Australia for many years, will continue his connection by representing the company on the board of directors of Pritchett Pty Ltd.

Pyrotenax World Rights

AS from this month, Pyrotenax Ltd. have taken over world selling rights of the m.i.c.c. cables, whether produced in the French, English, Canadian or Australian factories. This results from a new agreement with the French companies, Societe Alsacienne de Constructions Mecaniques and Le Conducteur Electrique Blinde Incombustible, the licensers of the original patents. Until now the activities of Pryotenax Ltd. have been restricted to the UK and the British Commonwealth. The business was started here in 1936 and was turned into a public company in 1954. There are subsidiary companies in Canada (with a factory in Toronto), in Australia (with a factory in Melbourne), and an associated concern in New Zealand.

Ericsson-Bendix Link

UNDER an agreement concluded between the Instrument Division of Ericsson Telephones Ltd. and the Bendix Corporation of America, a new company is being formed with the title of Bendix-Ericsson UK Ltd. to be located at Nottingham. This jointly owned concern will manufacture and market a wide range of high precision instruments and electronic devices. The aim is to expand the sales of existing products and to make additional products under licence from the parent companies. Managing director of the new concern will be Dr J. H. Mitchell, research director of Ericsson Telephones.

Electrolux Dishwasher?

IT is commonly believed that Electrolux are planning to widen their range of electrical appliances. The fact that an Electrolux dishwasher is already on sale in some continental countries suggests that this might be one of the first appliances to be introduced. However, due to differing kitchen practice in this country, the design would require modification, so it may be several months before a model can be launched here.

Green-Yellow For Earth Cores

THE earthing core of flexibles will in future be identified by a combination of yellow and green. That was agreed to by 15 European countries at the recent CEE meeting, including the UK, but countries may keep their national colours. This will avoid the danger of incorrect connections when appliances are imported from foreign countries. Last year attention was drawn particularly to flexibles imported from countries where red is the standard for the earthing core. In addition it was recommended that the other two cores of the flexible should be coloured blue and black, but the UK could not subscribe to this resolution because of the views of the IEE wiring regulations committee. Therefore, the future flexibles colours will be green-yellow or green, red and black in this country, and green-yellow, blue and black applying in the fourteen other countries.

S.W.E.B. District Managers Lose Claim

THE claim that the 13 district managers of the South Western Electricity Board (where sub-areas were eliminated on 1 April, 1958) should be placed on Grade 7 of the Managerial and Higher Executive Scale, instead of Grade 6, has been rejected by the Arbitration Court. The boards contended that the South Western Board was not organised on a two-tier basis and that the district managers were upgraded from Grade 5 to Grade 6 in April, 1958, "in recognition of their increased responsibility consequent upon the abolition of sub-area managers." They submitted that Grade 7 for district managers was introduced only to meet the position in the London Electricity Board (which, between 1953 and 1957, had disbanded their sub-area organisation). In the LEB there was a clear-cut two-tier organisation with headquarters and districts and no intermediate levels of staff. The LEB did, however, have four management officers whose main duties were to see that district managers, while exercising the maximum of responsibility and initiative, conformed with the Board's policy.

The LEB district managers, it was submitted, were responsible for the proper management and co-ordination of operations within their districts and had direct access to the chairman and deputy chairman. The four management officers were concerned with general management and co-ordination of operations. With the disappearance of sub-area managers the district managers had acquired some increase in executive authority for capital expenditure, a slight increase in responsibility for staff appointments and the right of access to the chairman.

In the SWEB, with the disappearance of sub-area managers, the district managers had acquired some increase in executive authority for capital expenditure, a slight increase in responsibility for staff appointments and the right of access to the chairman.

These increases in responsibility were qualified by having (a) two group advisers to guide and advise district managers and maintain personal liaison between the chairman and district managers; (b) chief officers at H.Q. exercising functional co-ordination through group officers; and (c) group officers extending to district managers the same assistance as they did when they were sub-area officers. The present SWEB organisation could not be described as being fully two-tier, but rather as two-tier on managerial matters and three-tier on functional matters, it was contended by the Board's side.

While agreeing that the organisation of the South Western Board differed in some respects from that of the LEB, the associations maintained that the SWEB became a two-tier organisation in respect of managerial responsibility from 1 April, 1958. The latter's group staff now acted as headquarters staff and were outstationed for geographical reasons only, they claimed. They had no executive authority over district managers, whose direct responsibilities were equivalent to those operating under the LEB two-tier organisation. SWEB district managers received no advice, instructions or assistance which would not be given by headquarters in a two-tier organisation.

The argument that the functions of the four LEB management officers were not unlike those of the SWEB's group advisers was unacceptable in that the latter were advisers with no executive or managerial responsibilities, whereas the LEB management officers had executive authority, the associations contended.

The SWEB district manager was now performing duties previously undertaken by the sub-area manager, and the associations did not agree with the Board's view that there had been little transfer of actual responsibility.

Engineers Claim £1 Rise

A CLAIM for an increase of £1 a week in pay for their members was submitted by the Confederation of Shipbuilding and Engineering Unions last week. The management board of the Engineering and Allied Employers' Federation subsequently considered the application and are now seeking the views of the 46 member associations on the matter. Their reply is expected some time next month. In fact the unions first submitted a claim for a "substantial increase" last June.

At last week's meeting, Mr W. J. Carron, president of the AEU, supported the claim with arguments on increased production, gross profits and a rise in the cost of living.

OFFICIAL PUBLICATIONS

Industrial Court Award — South Western Board—district managers —claim for upgrading. HMSO. 8d (see page 534).

Electrical Accidents and their Causes, 1959. HMSO. 5s 6d (see page 512).

Fourth Report of the Mobile Radio Committee. HMSO. 9d (see page 536).

Select Committee on Nationalised Industries (Rail Modernisation). HMSO. 22s 6d (see page 536).

Electricity (Scotesco Pension Fund) (Winding Up) Regulations, 1960. S.I. 1724. HMSO. 3d (see page 537).

Switchgear for Turkey

A BRITISH company has been successful in obtaining contracts valued at £65,000 for switchgear in connection with new oil refineries being built in Turkey. The successful company was South Wales Switchgear Ltd. who, on 25 July, entered into a £20,000 contract for equipment to be installed at Istanbul and, a fortnight later, received a further contract for £45,000 worth of switchgear and ancillary equipment to be delivered to the Atlas refinery being erected near Mersin.

The refineries are being built by Kellogg International Ltd. for the Caltex Oil Co. at Istanbul and by the Foster Wheeler Organisation for the Standard Oil Co. of New York at Mersin. The former contract is for one 15-panel and one 8-panel switchboard rated at 150 MVA, 3·3 kV, both of single busbar air insulated indoor pattern. The latter is for two sets of switchboards rated at 250 MVA, 6·6 kV, single busbar air insulated pattern interconnected by 1,000 amp trunking, and a 13-panel control board.

Do-it-yourself Control Desk

THE new system control building of the Chiltern's sub-area at Sundon is equipped with a control desk made by engineers of the Eastern Board. Several people had a hand in this "do-it-yourself" effort, shown alongside, and experiments with the prototype showed the difficulties of designing so that the control engineers were able to reach all switches conveniently. After several experiments an arrangement was found in which the telephones, warning lights and switches were all within easy reach of hand or eye. Formica was chosen for the desk surface and the sides were clinker-built. The work took several months and it is estimated that about £1,000 was saved by building the equipment by the area board staff.

Pump motors for Blyth "B"

AN order valued at over £176,000 has been placed with the GEC by Hathorn Davey and Co. Ltd., the pump makers, for six 2,150 h.p. booster pump motors and four 4,750 h.p. stand-by variable speed boiler feed pump motors with liquid controllers.

These are required for the new "B" station under construction at Blyth.

BOARDS' APPLIANCE SALES

ALTHOUGH the boom in sales of major electrical appliances largely subsided with the imposition of hire-purchase controls last April, the sales figures of the various electricity boards provide interesting evidence of their part of the expansion which occurred in the 12 months ended 31 March last. Sales of cookers, refrigerators and washing machines of eight of the 12 boards in England and Wales, set out, right, show the trend in the respective areas and, among these, although the Eastern Board had the largest sales of cookers and refrigerators, the Yorkshire Board achieved a 39% increase in cooker sales, 27% for washing machines and 190% for refrigerators.

In washing machine sales, the North Western Board achieved the highest total among those given and that Board also sold 28,179 vacuum cleaners, 16,043 clothes driers and 29,350 fires and heaters, we are told.

Of those boards for whom specific figures are not available, the South Eastern Board's refrigerator sales increased by 96·9%, while cookers rose by 16·5% and washing machines by 26%.

Appliance sales in year to 31/3/60

Area Board	Cookers	Refrig-erators	Washing machines
South Western ...	27,147	10,144	8,351
Eastern	45,383	34,126	24,011
East Midlands ...	22,026	6,668	7,052
Midlands	30,188	17,914	23,330
Merseyside & N. Wales	28,881	8,034	13,032
Yorkshire ...	33,202	8,783	12,920
North Eastern ...	20,796	5,115	8,498
North Western ...	44,001	15,378	25,387

"Servis" in Eire

"SERVIS" washing machines are to be made at the Dunleer, Co. Louth, Eire, factory of AET. This is the result of an agreement just concluded between the General Electric Co., of Ireland, and Wilkins and Mitchell Ltd. Initially, at least, the idea is that the factory will produce for the Irish market, but at a formal reception given by the directors of both companies in Dublin last Thursday, Mr Hilliard, Minister for Posts and Telegraphs, expressed the hope that the directors of Wilkins and Mitchell would give serious consideration to the incentives offered by the Eire Government in the matter of exports from that country. He felt that they might find it advantageous to have a portion of their export trade catered for from an Irish base.

E.F.T.C. move

THE offices of the Electrical Fair Trading Council at Sardinia Hse, Sardinia St, W.C.2, have been vacated due to the termination of the lease. Until further notice the Council is operating from Kemble Hse, Kingsway, W.C.2. Telephone 8000, extension 162.

NEW FACTORY FOR YORK SHIPLEY

YORK SHIPLEY LTD., the industrial and commercial refrigeration firm, are setting up a new factory on a 20-acre site at Basildon, Essex. It is planned in the first phase of the expansion to transfer manufacture of the smaller hermetic and belt-driven condensing units, automatic ice-maker production, and other sections concerned with the assembly of commercial refrigeration equipment.

Nuclear link-up title

UNITED POWER CO. is the title chosen for the new concern which is to link the GEC-Simon-Carves nuclear-energy group with Atomic Power Constructions. The intention to join up was reported in our 30 June issue. The new concern has a nominal capital of £100,000 in £1 shares, split equally between the two groups. It has been formed with the object of designing and building nuclear power stations in the UK.

Refrigerator Deliveries in August 17½% down

MANUFACTURERS' deliveries of domestic refrigerators to the home market in August were 17½% down on the same month of last year. The Domestic Refrigeration Development Committee now states that deliveries in that month totalled 53,930, compared with 65,489 a year earlier. The figure is also considerably below that for July —97,965. Total deliveries in the first eight months to the home market are, however, still 30% up on the same period of 1959—805,338 against 617,428.

Exports also continue to rise, deliveries for August amounting to 7,649—an increase of 40% on a year ago. Total for the first eight months of the year is 95,533—42% up on the 1959 period.

Sterne's cut production

BECAUSE of reduced requirements of certain customers at home and abroad, L. Sterne and Co. Ltd. have cut back production in their hermetic unit division which manufactures sealed motor compressor units for refrigerator firms. About 175 employees at the Hillington factory are being laid off. That division has been employing some 1,200 men, with output running at over 3,000 units a day. The latter figure is being reduced to just over 2,000 a day.

TAKEOVER NEWS

DELTA METAL CO. LTD. have made an offer for the 688,080 Ordinary 5s shares of Sperryn and Co. Ltd., manufacturers of lampholders, etc. They offer one Delta 5s share for each Sperryn share. Delta Metal are also negotiating for the acquisition of G. H. Edwards, a brassfoundry concern.

HONEYWELL CONTROLS LTD. have acquired the share capital of New Electronic Products Ltd., whose products include the Melrose artificial heart and lung machine. NEP will continue to operate separately under the present managing director, Mr Z. F. Kellerman.

LARGE TRANSFORMERS FOR CROSS-CHANNEL SCHEME

SOME indication of the size of the two rectifier transformers for the cross-Channel d.c. power link being made at the Walthamstow works of Fuller Electric Ltd. may be gauged from the photograph alongside, taken during a visit by CEGB senior officials. The latter are standing in front of the lower section of the tank for one of the transformers. Left to right are: Messrs P. H. W. Everitt (works director), J. L. Egginton, F. H. S. Brown, A. J. Haselfoot (director and chief engineer), E. S. Booth and D. S. Young (sales director). Individual transformer output is 95/95/65 MVA, three phase, 50 c/s. Each has three windings, giving no-load ratio of 284/83·6/33 kV with a tapping range ±15% controlled by a Fuller resistor transition on-load tap changer.

Cable Fault Caused Fire, says Jury

AN electric fault in a cable was the cause of the fire at a Liverpool store which caused the death of 11 people. There was insufficient evidence to disclose the cause of the fault. That was the decision of the jury last week, given in the form of a rider to a misadventure verdict at the end of an 11-day inquest. Another rider recommended that all electrical installations should be exhaustively tested and test certificates produced before the circuits were energised. Before submitting these recommendations the foreman of the jury referred to the electrical installation saying there was no evidence of "reckless negligence" during installation.

During the inquest there has been a clash of expert opinion on several questions of electrical engineering. One was whether the fire could have started in the cable, another on the current at which the fuse protecting the cable had blown. Summing up, the Coroner had told the jury that they had a statutory duty not to frame their verdict in such a way that civil liability was determined. The Coroner recalled that when the fire was extinguished and the fire brigade inspected the building, they came to the conclusion the electrical fault had started the fire and got in touch with Mr D. A. Picken, the local inspector of factories. Later, Mr Picken was asked to help on the electrical side by the Coroner and "had a very difficult task." Mr Picken had described tests which decided that parting of a cable core had caused arcing which provided intense heat to set alight nearby inflammable material. Other engineers disagreed about this possibility, but, as stated above, the jury felt the matter had been decided, although they did not suggest what was the cause of the cable fault. The Coroner considered that evidence had largely disposed of the possibility that a cigarette end had caused the fire to start.

A transcript of the evidence at the inquest has been sent to the Home Office, who asked for a full investigation at the inquest so that a separate inquiry would not be necessary.

New Stafford H.Q. for M.E.B.

MORE than £1¼ million has been devoted to improving and expanding the distribution system in the Stafford district by the Midlands Electricity Board in the past 12 years. This expenditure includes the changing over of about 1,000 consumers from d.c. to a.c., the conversion of the h.v. system from 6·6 to 11 kV and the extension of rural supplies.

Although this only reflects the activities of the MEB throughout its area and which have brought in their trail acute problems of office accommodation for the staff, in Stafford it has been exceptionally severe with people working as many as six in an office.

A short time ago a four-acre site was purchased from the Stafford Borough Council on which has now been erected a new depot, headquarters and offices. The building also incorporates a zonal garage for the maintenance of the Boards's 800 vehicles.

Rail Modernisation Costs

WHEN we published a summary of the Rail modernisation report of the House of Commons Select Committee on Nationalised Industries (28 July), the evidence on which the committee had based its findings was not publicly available. A full transcript has now been published by HMSO. The report dealt with costs, potential return on investment, and staff recruitment questions.

South Shields Line—

Alternative route proposed

AN alternative route for the proposed 275 kV line in the South Shields area has been suggested by the CEGB. The South Shields Town Improvement Committee has recommended the TC to adhere to its objections to the scheme on the grounds that the line should be underground in built-up and residential areas. The latter proposal was described at the public inquiry three months ago by the Board's spokesman as impracticable because it would cost £1,167,000.

The route is part of a 50-mile line to run from Blyth to Lockenby, in North Yorkshire.

The Board have now suggested a route crossing the Bede Trading Estate and Newcastle Rd and following the railway via Whiteleas to the borough boundary.

UKAEA drop Icse

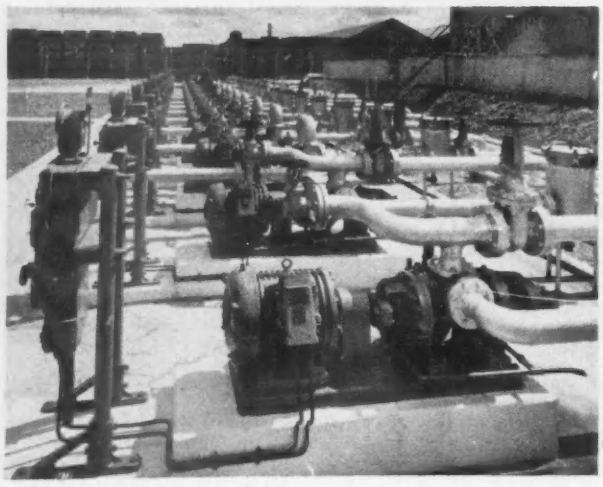
ABANDONMENT of plans to build a large experimental machine to investigate controlled thermo-nuclear power was announced last week by the UKAEA. Sir William Penny, member of the Authority for Scientific Research, said that the cost of the machine had risen from the provisional estimate of £1¼ million to £3 million—but this was not the prime reason for its abandonment. To go on with the plan would have meant having more scientists and engineers engaged in it than was thought justified with the present manpower situation. Instead, the Authority plan a number of smaller experiments to investigate controlled thermo-nuclear physics.

MOBILE RADIO FREQUENCIES

AN early move to 25 kc/s channel spacing for land-mobile radio communication in the VHF high band is made by the Mobile Radio Committee of the Post Office in their fourth special report, published last week. The recommendation directly affects electricity boards operating VHF radio; Mr G. F. Peirson (Midlands EB) represents them on the committee.

The report says that the high band (165-173·05 Mc/s) contains 7,800 base and mobile stations and that the total number of land-mobile stations has doubled every three years over the last 12 years. The present situation is that changeover from the original 100 kc/s channelling to 50 kc/s channelling is in progress. The committee recommend that from 1 Jan., 1961, AM equipment for all new services and new equipments for existing service should conform to a 25 kc/s specification; such equipment is readily obtainable and costs little more than 50 kc/s equipment. FM equipment from that date should also conform to the 25 kc/s specification, but present users of FM should be allowed to fit 50 kc/s equipment until 1 Jan., 1966. All 100 kc/s equipment should be replaced by 25 kc/s equipment not later than 1 Jan., 1962, and all 50 kc/s equipment replaced by 1 Jan., 1966.

The report includes recommendations for allocation of individual 25 kc/s channels to various types of users. Six channels for mobile stations and two for base stations are allocated to fuel and power industries.



At the Shell-Mex and BP new Royston depot, oil is pumped direct from rail cars to storage tanks for distribution to road wagons. English Electric FLP motors—12 15 h.p., two 21 h.p. and two 5½ h.p.—drive 16 road wagon pumping sets

B.S.I's Hemel Hempstead H.Q. opened

The Hemel Hempstead testing centre of the B.S.I., headquarters of the approvals agency operated by B.S.I. on behalf of the Canadian Standards Association, was formally opened on 27 Sept. by the Canadian Acting High Commissioner, Mr G. Iquatieff. The agency, now ten years old, approves British electrical equipment destined for Canada. Our picture shows Mr H. A. R. Binney, B.S.I. director, left, presenting an inscribed silver salver to Mr D. Maxwell Buist who, in 1950, led the British mission to Canada which negotiated the setting up of the joint approvals agency, and who was until recently chairman of the B.S.I. Committee on Canadian Approvals

Minister criticised on Council Appointment

THE decision of the Minister of Power to appoint Sir Raymond Streat as chairman of the North Western Electricity Consultative Council was strongly criticised by members of the Council at its meeting last Friday. A motion was carried expressing concern that the Minister had gone outside the 144 members of the Council and its nine district committees in making the appointment. Members of the Council emphasised that their criticisms were on the question of principle and not directed at Sir Raymond personally. (Sir Raymond retired in 1957 from the chairmanship of the Cotton Board, which he had held for 17 years, and has since accepted several business appointments.)

The Council also approved a motion expressing extreme disappointment that the Minister had not reconsidered his decision not to reappoint Mr F. Kenyon, who is 73, and has been chairman for the past eight years.

Mr Kenyon expressed disappointment that members had not been considered.

India bans some electrical goods

ELECTRICAL goods are among imports recently banned by the Indian Government for the next six months. They include house service meters, street lighting fittings and floodlights. The ban has been imposed to alleviate the drain on India's foreign exchange reserves and to stimulate utilisation of the country's own industrial resources. Also restricted are imports of wrought copper, brass and bronze.

Linear Lighting on Great North Road

THE first full scale installation of the new Mazda linear sodium lamps on a main highway in the North of England has just been completed. The site is a 2,000-yd section of dual carriageway on the Great North Road three miles north of Newcastle-on-Tyne, which is known locally as the "death mile" on account of the number of accidents which have occurred since the road was converted to dual carriageway and derestricted.

The installation comprises 43 Mazda "Amberline" lanterns mounted on 35 ft Stewart and Lloyd steel columns set back 18 in. from the kerb on the nearside of each carriageway and in the central reservation. The maximum spacing between columns is 170 ft with closer spacing at junctions and bends. Particular care has been taken in siting lanterns at intersections.

The lamp housings have been specially designed to accommodate the new lamp and present a pleasing daylight appearance. They are also economic in maintenance. The 200 W linear sodium lamp is, of course, the first lamp to achieve an efficiency of 100 lumens/W.

By its use in main road lighting, the overall illumination is doubled at only 38% increase in cost, using the usual standard lamp columns and spacings.

Installation was completed in the remarkably short time of six weeks. The design was the work of the Castle Ward Rural District Council (surveyor and engineer, Mr G. E. Dimmack, M.I.MUN.E.) who were acting on behalf of the North Gosforth Parish Council. AEI Lamp and Lighting Ltd. were the main contractors and Abacus Engineering Co. Ltd. were responsible for erection.

Increased demand for BICC "Panelec" floor-warming systems has necessitated the company's Panelec Heating Division seeking fresh accommodation to house extra staff needed. The new offices shown here at 83-86 Saffron Hill, E.C.1, were officially opened on 28 Sept.

Substations are a problem

TOLD that another 250 substations would be needed in Cardiff to meet the city's future power demands, members of the City Parks Committee suggested that any new substations should be installed underground. They had criticised the substation constructed by the South Wales Electricity Board at Robinson Sq. Splott, which was described as a monstrosity. "It has four walls and an iron door and no other part of the city would stand for it," one member declared.

The Committee agreed to the suggestion of the South Wales Electricity Board that the substation should be roofed without the overhanging canopy originally suggested to avoid danger to children, but at the same time expressed displeasure about the building.

C.P.O's for Holme Pierrepont

COMPLAINTS that the CEGB had applied for compulsory purchase orders for land at Holme Pierrepont long before the public inquiry into the proposals of the erection of a power station there were made at the Bingham RDC meeting. (The public inquiry is to be held at Radcliffe on 22 Nov.) At the last Council meeting the CEGB, in a letter, explained that this move was considered a time saver so that the people affected by the purchase orders, should planning permission be granted, could make their objections at the inquiry. But members of the Council accused the CEGB of "jumping the gun," contending that it made a farce of the inquiry.

Scottish pension fund wound up

THE Scotesco Pension Fund of the former Scottish Electrical Power Co. is to be wound up. A Statutory Instrument published last week provides for the transfer of all assets and outstanding liabilities to the superannuation committees of the two Scottish Boards. Hitherto, this fund has been administered by the North Scotland HEB in association with the South Scotland EB.

Unions Move On Unofficial Activity

THE possibility of constitutional changes in the structure of the union side of the NJIC for the electricity supply industry which would provide for greater co-operation between the union negotiators and the rank and file was one of the main subjects discussed at last week's meeting of the union chiefs, we understand.

The activities of the unofficial shop stewards' movement which, in effect, has been undermining the authority of the union officials, has been causing concern to those officials who have no wish to see the formation of a "splinter group."

More "Silver" Trains for London Transport

ORDERS worth over £4 million for 619 further 1959 Tube stock cars to complete the rolling stock renewal programme for the Central and Piccadilly lines have been placed by London Transport. These orders are for car bodies and bogies only —much of the associated motors, traction control equipment, etc., for the cars has been on order since 1959, but further orders remain to be placed.

Of the 619 cars in the present order, 450 are to be built by the Birmingham Railway Carriage and Wagon Co. (338 driving motor cars and 112 non-driving cars) and 169 (all-trailer cars) by the Derby works of British Railways, London Midland Region.

Soviet Welding Tour Ending

THE Soviet Welding Delegation led by Dr B. E. Paton which has been touring British works since 16 Sept. is returning to Moscow next Saturday. This has been a reciprocal visit to that by a British Delegation to the USSR last June. At a meeting in the BEAMA offices, London, recently, the two delegations met to exchange views.

Sayings OF THE WEEK

"It is very easy for television to be audible wallpaper." . . . MR L. MIALL, BBC TV Talks Department, speaking to the Batti-Wallahs' Society.

"We are not satisfied with the voltages some consumers are getting nor with the reliability of their supply." . . . MR A. N. IRENS, chairman, South Western Electricity Board, speaking on the Board's report.

"The regulations which are statutory in factories are very conservative indeed, and the standard of lighting which results from strict adherence to the minimum permissible values is not good lighting by modern standards." . . . R. G. HOPKINSON, head of the DSIR Lighting Section, at the Conference on Ergonomics.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, October 4

	£ per ton	Weekly change £
COPPER, standard class A (settlement) ...	226½	−5½
,, (3 months)	228¾	−4¾
LEAD, refined pig, 99·97% purity (cash)	68⅜	—
,, (3 months)	70	+1
TIN, refined, min. 99·75% purity (settlement)	802	−3
,, (3 months)	798½	−3½
ALUMINIUM, ingots 99·99·5% ...	186	—
,, wire bars (4×4×54")	193¼	—
BRASS Strip 63/37	200½	−6½
SILVER (Troy oz)	79½d	—

	£ per ton	Weekly change £
ZINC, virgin, min. 98% purity (cash)	87½	+½
,, (3 months)	87½	+1¼
RUBBER, per lb No. 1, RSS. spot	29d	—
c.i.f. basis, ports. Dec. ...	28⅛d	−2⅛d
ARMOURING: Galv. Steel Wire (0·104 in.) ...	66½	—
Mild Steel Tape (0·04 × 1½ in.)	53*	—
NICKEL (home)	600	—
MERCURY (76 lb flask)	70	+1
AMERICAN PRICES: Copper, electrolytic (per lb) ...	31c	−2c
Lead, (New York)	12c	—

* *Tape Price, now an average, includes varnishing*

Market for Cookers in W. Germany

A LARGE potential market for electric cookers exists in W. Germany. According to a report made by the British Embassy in Bonn, only one in every three German households has an electric cooker. Although in Germany electric cooking is more expensive than by gas, it is widely recognised as being cleaner and safer. Demand, on the whole, has been for smaller cookers having hotplates only, but there is a growing trend towards larger "luxury" models as known in this country, incorporating oven, grill and quick-heating plates together with refinements such as oven light and automatic timing. Foreign firms wishing to sell in the Republic would, however, be competing with about 26 indigenous firms. To enter the market it would be necessary to set up a selling organisation in the country backed by extensive advertising. But to keep a foothold in this market, the report emphasises, manufacturers concerned must be alive to new ideas, pay strict attention to design and up-to-the-minute appearance of their products while at the same time keeping prices competitive.

Trade in August

FOR the first time since March, 1958, the hire-purchase debt fell in August—from £971 million to £970 million. The amount owed directly to household goods shops dropped £4 million to £328 million. But the Board of Trade states that retail sales generally were fairly well maintained in August, the index of the total value of sales (seasonally adjusted) being 110 for the month, as against 112 for July. For independent radio and electrical shops the index was down 6%, and for department stores 3% down.

Batti-Wallahs' Luncheon

SPEAKER at last week's monthly luncheon of the Batti-Wallahs' Society in London was Mr L. Miall, of the BBC Television Talks Department. He dealt wittily with the policy of BBC TV in the "serious" programme field, saying that the Corporation had kept up the level of about one-third serious material during peak viewing hours. He also paid tribute to the help advances in electrical and electronic engineering had given the programme organisers by making possible compulsive up-to-the-minute reporting. The next luncheon of the Society is to be held on 27 Oct.

Order from Uganda

BELLISS AND MORCOM LTD. have won a contract for a 3,000 kW back-pressure turbo-alternator set for a sugar refinery in Uganda. As main contractors, that firm is responsible for all the power generation equipment which includes the alternator exciter and main step-up transformer to be supplied by the General Electric Co. In the face of heavy competition, price, efficiency, quick delivery and past performance secured the order.

E.I.B.A. Golf

AT the annual Electrical Industries' National Golf Championships at Birmingham last week, Mr B. Rolfe won the Sir Montague Hughman trophy and the J. Y. Fletcher cup. Runner-up was Mr W. M. Hawksworth who received the J. L. Wilson cup. Winners of the Sir Felix Pole Foursome trophies were Messrs H. Fletcher and F. C. Lucas, runners-up being A. S. Lee and L. Bowen. At Sutton Coldfield the EWF Visitors' trophy was won by Mr B. R. Fletcher, with W. G. Ellson runner-up. The Veterans' trophy was won by Mr L. H. Welch, runner-up being Mr G. F. Sills.

News in Brief

The whole of the borough of Barnes has now been changed over to a.c.

Portishead Council are planning a new swimming pool with electric heating.

With the completion of new street lighting in 4¼ miles of roads, Willesden Town Council have approved a £24,000 contract for another lighting scheme involving Neasden La and Dudden Hill La.

Ekco-Ensign Electric Ltd. recently held their annual sales conference at the Abbey Hotel, Malvern.

Company Activities

THE electrical industry came into the limelight with a vengeance last week. Overshadowing all other Stock Exchange business was the news that the General Electric Co. and the English Electric Co. were to "explore immediately" the possibility of a merger. The companies have in mind the formation of a holding company and if the scheme comes to fruition the new group would have net assets of £177 million and employ 154,000 people. As such it would be even larger than Lord Chandos' Associated Electrical Industries, which has £166m net assets.

The shares of GEC have been an active market lately on rumours that a tie-up with another big group was in the offing. But the other company most frequently mentioned in this connection was Sir Joseph Lockwood's Electric and Musical Industries. The appearance of English Electric in the field was something of a surprise, but it seems well suited to team up with GEC. Suggestions that English Electric might take over all "heavy" business with GEC absorbing the rest have been denied. This is not surprising. GEC has substantial interests in the nuclear power field which would no doubt prove difficult to unravel. It would also clearly be to the advantage of any new organisation to retain the goodwill attaching to the English Electric and General Electric names. A spokesman for GEC has said that the greatest scope for the new giant would be in domestic appliances and electronics, and the long-term effects of the plan on other producers could be far-reaching. The terms of a merger are not likely to be known for several months.

In all the excitement the acquisition of Ardente and Ardente Acoustic Laboratories by EMI went almost unnoticed. But it is an important landmark all the same and will give EMI control of a thriving business manufacturing hearing aids and miniature electronic components. By all accounts it is the latter which interest EMI most and Sir Joseph Lockwood's money bags are likely to be used to develop this side to serve the group's computers and missiles. For all this EMI paid about £610,000 which is regarded as cheap and a better bargain than the recently acquired Morphy-Richards business.

Even that was not the end of last week's take-over news. Pye, which swallowed up the Telephone Manufacturing Company a few weeks back, announced a private placing of £3 million 6½% debenture stock 1980-85 at par. It came as no surprise. Pye chairman, Mr C. O. Stanley, had previously stated that he was not in favour of a rights issue to finance the completion of the Telephone deal. Financially it was sound policy, for good class debentures with a high running yield have been in demand in the market. One of the features of dealings last week was a genuine investment demand for gilt-edged issues with War Loan 3½% especially favoured. American buying has been largely responsible for this show of strength. Interest rates in the United States are now so low that short-term funds are even being attracted by British Government stock as well as normal holdings of Treasury Bills.

Another talking point in the City has been the increase in prices foreseen by the chairman of the Electricity Council—a step which has almost been forced on the industry by more expensive coal and higher wages. The increase in coal prices is expected to have a purely marginal effect on fuel usage and by 1965 consumption of coal should be 8-10 million tons higher. Demand for electricity is expected to rise about 45% in the next five years.—*From our City Correspondent.*

Ada (Halifax) Ltd.

Philips Electrical Industries say they have received acceptances or such intimation in respect of approximately 70% of the Ordinary capital of Ada for which they offered 3s 9d a share (which we reported on 8 Sept.) and the offer is now unconditional. Meanwhile, dissatisfied shareholders claiming the support of holders of 1½ million of the 11 million Is shares want an extraordinary general meeting, and are considering an application to the Board of Trade for the appointment of an inspector to investigate the company's affairs. It is also revealed that Longford Electric Co. at one time considered making a bid for Ada.

Bell's Asbestos and Eng. (Holding)

It is proposed to raise approximately £1 million in a rights issue to repay bank overdrafts and provide additional group finance. Price of the issue is to be announced later. These new shares will not participate in the 7½% interim. On the information at present available to them, the directors anticipate that profits for the current year will exceed those for 1959.

Bennis Combustion Ltd.

There is no dividend on the Ordinary for the year ended 30 April last. Operations for the period resulted in a group trading loss of £3,025 after writing back unrequired provisions in respect of contracts now completed and after adjusting for unrequired provisions for deferred repairs by a subsidiary. In the previous year there was a profit of £23,671.

George Cohen 600 Group

Terms of the proposed rights issue will be announced in November, if market conditions are suitable, Mr C. M. Cohen, chairman, told shareholders at the annual meeting last week. He gave an assurance that if, at some future date, it is proposed to issue all or part of the remaining £1,625,000 of Ordinary capital in circumstances which would result in a radical change either in the control of the company or the nature of its business, the matter will first be referred to the stockholders.

Holophane Ltd.

With profit for the year ended 30 June last increasing slightly to £105,777 (*£97,139*), final dividend is raised 4% to 24%, making the total distribution 30% (*26%*).

K.G. (Holdings)

The chairman, Mr P. R. V. Wheeler, expects the results for the year to 31 March next to show an improvement over those for 1959-60. The subsidiary, F. H. Wheeler and Co., in particular, has a very considerable increase in work in progress.

F. McNeill and Co. Ltd.

This concern's two cable companies—General Cable Manufacturing Co. and Britannic Cables Ltd.—incurred an appreciable loss in the six months ended March last, and the latest available figures disclose that a further loss was sustained in the following three months, the directors report. Mr C. W. R. Pantlin, the chairman, states that it was not possible that there would be any improvement until October. If the expectations of the board are fulfilled, the results of the cable group for the year ending September, 1961, should indicate that, provided no special circumstances intervened, they will have weathered the storm and returned to a profit-earning basis.

Radio and Television Trust

Order books are at a satisfactory level and the main difficulty is to obtain sufficient personnel, the directors report. In particular, the development departments are being strengthened. Earlier this year, the company acquired the capital of British Communications Corpn. Ltd. and the full accounts shows £121,003, out of a total of current liabilities of £331,213, as being due to former holders of BCC.

Scottish Cables (South Africa) Ltd.

The trading profit for the year to 30 June last is £183,903 (*£134,224*) and the dividend is 12½% (*10%*).

Dividends Declared

Drayton Regulator and Instrument Co. Interim 7½% (*same*).

Ericsson Telephones. Interim 4% tax free (*same*).

Muirhead and Co. Interim 2½%.

Superheater Co. Interim 4½d per share (*same*).

Telephone and General Trust. Interim 5% (against equivalent of 4½%).

Sturtevant Engineering Co. Interim 3% tax free (*same*).

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

6 Oct.—Belfast C.C. Lift installations in proposed College of Art.—See 22 Sept. issue.

6 Oct.—Cardiff C.C. Erection of 1,260 Class "B" concrete columns and complete installation of 80 W mercury lanterns/gear, on fixed-price basis, contract 6.—See 22 Sept. issue.

6 Oct.—Oswaldtwistle U.D.C. Renewal of electrical installations in 22 houses, Central Ave. Surveyor, Town Hall, Union Rd.

7 Oct.—Dun Laoghaire. Supply and erection of two 3½-ton cranes.—See 15 Sept. issue.

7 Oct.—Ilkley U.D.C. Supply, erection and putting into service of 3,100 yd of 400 W colour-corrected mercury m.v. lighting on steel columns complete with control gear, fuses and brackets for A65 lighting.—See 15 Sept. issue.

7 Oct.—N.I. Housing Trust. Electrical installations in (a) 61 dwellings at Ballyclare No. 2; and (b) 64 dwellings and one shop at Whitehead No. 3.—See 29 Sept. issue.

7 Oct.—Southport B.C. Electrical installation at Floral Hall.—See 1 Sept. issue.

8 Oct.—Chilton P.C. Supply of 21 sodium vapour and ten tungsten lamps/brackets/gear for trunk road lighting.—See 15 Sept. issue.

8 Oct.—East Kesteven R.D.C. Provision of additional power and lighting points included in modernisation of (1) 72 houses at Ruskington and Anwick; (2) 79 houses at Ashby and Blankney Fen; (3) 66 houses Gt Hale and Heckington; (4) 72 houses at Aunsby, Burton and Pedwardine; (5) 75 houses at Billinghay and N. Kyme; and (6) 28 houses at Cranwell, Leasingham and Wilsford.—See 29 Sept. issue.

8 Oct.—Ellesmere Port B.C. Provision and erection of 34 Group "A" concrete columns/lamps complete, contract No. 298, for A41 Chester/Birkenhead Trunk Rd. Borough Engineer and Surveyor, Queen St.

8 Oct.—Haslingden B.C. Rewiring of power circuits in 44 houses, Free La, Helmshore, and Cedar Ave, Haslingden.—See 15 Sept. issue.

8 Oct.—Ilkley U.D.C. Rewiring of 28 houses at Menston.—See 22 Sept issue.

8 Oct.—North Witchford R.D.C. Contract 2. Supply and erection of duplicate 100 g.p.m. sludge pumps. Contract 3. Supply and erection of duplicate 20 g.p.m. and duplicate 100 g.p.m. ejectors, all complete with motors, starters and accessories.—See 15 Sept. issue.

10 Oct.—Armagh C.C. Electrical installation in Keady County Secondary Intermediate School.—See 15 Sept. issue.

10 Oct.—Belfast. (1) Electrical installation in proposed pavilion at Ballywonard, Glengormley, for Board of Governors of Belfast Royal Academy. Details from architect: A. Dorman, 8 Elmwood Ave, Belfast.

10 Oct.—Bristol C.C. Supply and erection of dual fuel sludge gas/diesel engine alternators, 750 b.h.p./525 kW at 3·3 kV 3-ph., together with associated waste heat recovery plant, switchboards, switchgear, transformers and cables.—Advertised 22 Sept. issue.

10 Oct.—Bury C.B. Electrical installation in public library.—See 29 Sept. issue.

10 Oct.—Camberwell B.C. Provision of Group "A" 200 W sodium lighting on steel columns in place of existing lighting: A221, six 140 units (112 new, 28 retained); A2208, 12 units (nine new, three retained). Replacement on existing columns: A2, 70 units; A202, 108 units; A215, 98 units.—See 22 Sept. issue.

10 Oct.—Chorley B.C. Installation of landing lighting in 51 dwellings. Borough Engineer, Town Hall. Deposit £1 1s.

10 Oct.—Merton and Morden U.D.C. Supply and erection of 80 Class "A" mercury vapour and sodium lanterns/gear/wiring units on 25 ft concrete columns along Wandle Rd, Green La and Middleton Rd.—See 29 Sept. issue.

10 Oct.—Thorney P.C. Erection of 19 Group "A" steel columns and 140 W sodium lanterns/equipment.—See 22 Sept. issue.

11 Oct.—Bilston B.C. Installation of lighting and power points in 40 pre-war houses. Housing Director, Municipal Bldgs, Hall St. Deposit £2 2s.

12 Oct.—Aycliffe D.C. Supply of (List 5) electrical goods for erection of 132 houses.—See 29 Sept. issue.

12 Oct.—Peterborough T.C. Lighting and power installations in 98 dwellings on Bluebell estate.—See 29 Sept. issue.

13 Oct.—Northwich R.D.C. Supply and erection of 206 Group "B" 15 ft concrete columns, 290 lanterns/control gear and resiting of existing columns.—See 22 Sept. issue.

13 Oct.—Stornoway Pier and Harbour Commission. Electrical work in erection of Customs Hse/Government offices/two dwellings in South Beach/Quay St. Applications to architects: Gratton and McLean, 21 Woodside Terr, Glasgow, by above date.

13 Oct.—Tyrone C.C. Electrical installation in Old People's Home, Omagh.—See 29 Sept. issue.

13 Oct.—Warrington R.D.C. Provision and installation of Class "B" lighting standards in various parishes.—See 22 Sept. issue.

14 Oct.—Belfast C.C. Supply of vertical fluorescent street lighting lanterns and brackets.—See 22 Sept. issue.

14 Oct.—Ellon B.C. Supply and erection of 21 Trunk Rd A92 lighting units.—See 29 Sept issue.

14 Oct.—Glasgow C.C. Supply of 450,000 yd p.v.c. aerial cable.—See 15 Sept. issue.

14 Oct.—Hitchin U.D.C. Erection and commissioning of 30 Class "A" and 65 Class "B" lighting units in various areas. Council Surveyor, Council Offices, Brand St.

14 Oct.—Maidstone B.C. Scheme PW9, electrical installations in 24 flats in four blocks on Parkwood Housing estate. Borough Engineer, Palace Ave.

14 Oct.—Ross and Cromarty C.C. (g) Electrical work in erection of two blocks of two four-apartment houses at Tore, Black Isle. Applications to quantity surveyors: R. Armour and Partners, 375 Union St, Aberdeen, by above date.

17 Oct.—Cardiff. Supply of 400/440 V spark erosion equipment. Clerk to Governing Body, Welsh College of Advanced Technology, City Hall.

17 Oct.—Chelmsford R.D.C. Provision and erection of 64 Group "A" 25 ft concrete columns/brackets and 140 W side entry sodium lanterns/lamps/gear along A12 at Mountnessing, near Brentwood. Engineer and Surveyor, Council Offices, New London Rd. Deposit £2 2s.

17 Oct.—Knaresborough U.D.C. Supply and erection of 50 Group "A" concrete columns with sodium discharge lamps/control gear for Bond End/Boroughbridge Rd street lighting. Engineer and Surveyor, Knaresborough Hse.

17 Oct.—Wallasey C.B. Electrical installation in Moreton Secondary Modern School extensions.—Advertised 29 Sept. issue.

18 Oct.—Beverley R.D.C. (e) electrical installation additions to 39 houses at Newbald, Wawne, Lund, Cherry Burton, Woodmansey, Little Weighton, Skidley and Swanland.—See 29 Sept. issue.

18 Oct.—Fylde Water Board. Garstang Borehole scheme: (a) two ¼ m.g.d. 170 ft head; (b) two surface pumps, 1 and 1½ m.g.d. at 320 ft; (d) cables; (e) switchboard.—See 22 Sept. issue.

18 Oct.—Littlehampton U.D.C. (Contract 24). Electrical installations in six houses, Helyer's Gn, Wickbourne estate. Engineer and Surveyor, Council Offices. Deposit £1 1s.

19 Oct.—Kirkburton U.D.C. Supply and installation of 88 200 W sodium discharge lamps on 35 ft steel columns for A629 Penistone Rd (second part) lighting.—See 29 Sept. issue.

19 Oct.—Sunderland T.C. Cable laying, 2,000 yd of 2-, 3- and 4-core p.i.l.c.s.t.a. cable for street lighting.—See 29 Sept. issue.

20 Oct.—Louth R.D.C. Contract 29: Supply and erection of 18,750 g.p.h. duplicate horizontal centrifugal booster pumps together with motors, starters and accessories for Kenwick Reservoir. Details from consulting engineers: John H. Haiste and Ptnrs, Belmont Hse, 20 Wood La, Headingley, Leeds 6. Deposit £3 3s, made payable to R.D.C.

21 Oct.—Bristol C.C. Supply of lamps, batteries, transformers, capacitors, sundries, cables, etc., for year from 1 Jan., 1961. City Engineer and Planning Officer, Cabot Hse, Deanery Rd, Bristol 1.—Advertised in this issue.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 108 queries answered this week

"Veto" switches—agents for? T.E.—Deta (Overseas) Co. Ltd., 31 Moscow Rd, Caroline Pl, W.2.

"R.E.D." irons—makers of? W.H.P.—Radio Electric Developments (Crewe) Ltd., Excelsior Wks, Walthall St, Crewe.

United States Electrical Co. Ltd., Cincinnati—agents for? G. and H.—Newage Machine Tools Ltd., 98 Croydon Rd, S.E.20.

"Coldspot" refrigerators—repairers of? M.L.—Electrical Refrigeration and Radio Engrs. (Epping) Ltd., 35 Little Russell St, New Oxford St, W.C.1.

"Limpet" insulating tapes—makers of? A.E.I.—Connollys (Blackley) Ltd., Blackley, Manchester 9.

"Wyndsor" recorders—address for? P.I.—Magnetic Recording Co., 2 Bellevue Rd, N.11.

"Ultra" hair dryers—repairers of? E.M.E.B.—Eugene Ltd., 90 Avenue Rd, W.3.

"Genii" immersion heaters—makers of? S.E.E.B.—George Nobbs (1935) Ltd., 87-89 Cleveland St, W.1.

"Fri-Fri" fish fryers—agents for? E.C.—Aga Heat Ltd., 30 Orchard St, W.1.

21 Oct.—Cork. Electrical services installation at Cork Airport, Dept. of Transport and Power, Kildare St, Dublin. Deposit £15.

22 Oct.—Bexhill B.C. Supply, erection and putting into service of 52 140 W sodium lamps on 25 ft reinforced concrete columns. —See 29 Sept. issue.

22 Oct.—Seaton Valley U.D.C. Supply and erection of 329 units and supply only of 132 units for street lighting scheme. Surveyor: T. W. Burgess, Council Offices, Seaton Delaval.

24 Oct.—Beverley R.D.C. Supply and erection of: Contract 2, two 180 g.p.m. sewage pumps and two 100 g.p.m. sludge pumps; Contract 3, four 40 g.p.m. and two 30 g.p.m. sewage ejectors for Leven and Tickton Sewerage Schemes.—See 29 Sept. issue.

24 Oct.—Billingham U.D.C. (Contract L1.) Supply: 15 concrete columns, A19; (L2) supply: 69 steel columns, A19; (L3) supply: 140 W sodium lanterns/lamps/gear; (L4) supply: 400 W m.v. lanterns/lamps/gear; (L5) provision and laying of cables, servicing of columns and lanterns; (L6) erection: 84 columns/lanterns, A19; (L7) provision and laying cables, New Rd; (L8) erection: 33 columns, New Rd; (L9) provision and laying cables, Haverton Hill Rd; (L10) erection: 59 columns/lanterns, Haverton Hill Rd; (L11) supply: 92 concrete columns, New and Haverton Hill Rds. Engineer and Surveyor, Council Offices, Haverton Hill, Billingham, Co. Durham. Deposit £1 1s each contract.

24 Oct.—E.B. for N. Ireland. Supply and erection of lighting and heating for No. 3 set at Coolkeeragh Power Station.—See 29 Sept. issue.

24 Oct.—Kingston upon Thames. Roof renewal, electrical ancillary works, etc., at Corpn. Depot.—See 29 Sept. issue.

24 Oct.—Pelton P.C. Erection of 30 60 W sodium lamps on concrete columns. Council Clerk, J. Glassey, Council Offices, Newfield, Co. Durham.

24 Oct.—S. Devon Water Board. Supply of 1,800 g.p.h. at a 286 ft head duplicate pumps and ancillary equipment for Sheldon Pumping Station. Chief Engineer, The Laurels, 46 New St, Honiton.

25 Oct.—Ealing B.C. (a) Supply of 88 140 W sodium lanterns/lamps/gear; (b) supply and erection of 85 25 ft steel columns.—Advertised 15 Sept. issue.

26 Oct.—Cardiff C.C. Complete £38,000 electrical installation, by contractors on N.I.C.E.I.C. roll, in proposed Teachers' Training College, Cyncode.—See 29 Sept. issue.

26 Oct.—Whitchurch U.D.C. Phase 1. Supply, erection and wiring of 45 150 W sodium lamps on 25 ft concrete columns and 59 85 W sodium on 15 ft columns.—Advertised 29 Sept. issue.

31 Oct.—Oldham C.B. Conversion of 15 mechanical public clocks to electric drive or electric wind.—Advertised 29 Sept. issue.

5 Nov.—New Windsor B.C. Supply of (Item 15) lamps and (Item 21) fittings and cable for year to 31 Dec., 1961. Applications to Borough Engineer, Kipling Bldg, Alma St, enclosing foolscap s.a.e.

14 Dec.—Matlock U.D.C. Supply and installation complete of nine sewage pumps at four pumping stations in Darley Vale. Details from W. H. Radford and Sons, 57 Goldsmith St, Nottingham. Deposit £3 3s, made payable to U.D.C.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

2 Nov.—Pakistan. 4,000 2,500 a.h. inert dry cells. Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong. B.o.T. (ESB/25196/60).*

8 Nov.—Ceylon. 15 10 kVA single-phase and four 25 kVA three-phase transformers. Chairman, Tender Board, Ministry of Agriculture, Land, Irrigation and Power, P.O. Box 500, Colombo. B.o.T. (ESB/24648/60).*

10 Oct.—Pakistan. Five d.c. motors of 4 and 5 h.p. and starters. W.P.D.A., Gardee Trust Bldg, Old Anarkali, Lahore. B.o.T. (ESB/25026/60).*

13 Oct.—Pakistan. Four 75 kVA; two 150 and two 250 kVA 3-ph. 6·6/0·4 kV transformers. Director of Stores, W.P.D.A., Gardee Trust Bldg, Old Anarkali, Lahore. B.o.T. (ESB/25066/60).*

14 Oct.—South Africa. Five 110 V and five 380 V 5 A kWh/kVAh meters. Town Clerk's Office, City Hall, West St, Durban. B.o.T. (ESB/25149/60).*

17 Oct.—Pakistan. Transformer 3-ph.: One 500 kVA 3·3/11 kV; one 1,500 kVA 11/33 kV; two 150 and three 350 kVA 3·3 kV/400 V. Director of Stores, W.P.D.A., Gardee Trust Bldg, Old Anarkali, Lahore. B.o.T. (ESB/25144/5 and 6/60).*

18 Oct.—Pakistan. 103 miles 132 kV transmission lines at Multan and Montgomery. W.P.W.P.D.A., Lahore. B.o.T. (ESB/25053/60/DLF).*

18 Oct.—Pakistan. 16,000 ft multi-core 660 V grade metal-sheathed non-draining paper insulated cable. Chief Controller of Stores, E.B. Railway, Pahartali, Chittagong. B.o.T. (ESB/25192/60).*

25 Oct.—India. Cables and accessories for up to 6·6 kV for Riverside Power Hse. General Manager, Kanpur Electricity Supply Administration, Kanpur. B.o.T. (ESB/25313/60).*

25 Oct.—Pakistan. Six seven-circuit and five four-circuit l.t. switchboards. Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong. B.o.T. (ESB/25393/60).*

26 Oct.—Rhodesia and Nyasaland. Six 500 kVA 3-ph. 11/0·4 transformers with option on six more. Town Clerk, P.O. Box 591, Bulawayo. B.o.T. (ESB/25118/60).*

27 Oct.—America. One 30 MVA 6·6/115 kV 3-ph. power transformer. District Engineer, U.S. Army Engineer District, 628 Pittock Block, Portland 5, Oregon. B.o.T. (ESB/25547/60).*

28 Oct.—S. Africa. Nine 12-channel and one three-channel carrier systems for S.A. Railways. Chairman, Tender Board, P.O. Box 7784, Johannesburg. B.o.T. (ESB/25561/60).*

31 Oct.—Australia. 84 s.-ph. current transformers, support structures, cubicles and cabling. Commercial Manager and Secretary, E.C. of N.S.W. ,Box 5357, G.P.O., Sydney. B.o.T. (ESB/25179/60).*

31 Oct.—Pakistan. 1·5 mile of three pairs 7/0·029 underwater telephone cable. Mr F. Rizwi, Purchase Co-ordinating Officer, Posts and Telegraphs Directorate General, Block 32, Frere Rd, Karachi. B.o.T. (ESB/25344/60).*

1 Nov.—Pakistan. 12 400 V a.c. motors. Chief Controller of Stores, E.B. Railway, Pahartali, Chittagong. B.o.T. (ESB/25191/60).*

4 Nov.—New Zealand. 140 W sodium street lighting lanterns. Town Clerk, P.O. Box 5045, Dunedin. B.o.T. (ESB/25387/60).*

7 Nov.—Pakistan. (1) 14 33/0·4 kV 50 to 250 kVA distribution transformers; (2) two 33 kV o.c.b's; (3) switches and low tension o.c.b's; (4) 100 miles a.c.s.r.; (5) aluminium conductor; (6) tubular steel poles; (7) 33 kV and l.t. insulators. Executive Engineer, W.P.D.A., Electricity Construction Division, Nowshera. B.o.T. (ESB/25382/60).*

7 Feb., 1961.—New Zealand. 434 220 kV double-circuit, galvanised steel transmission towers. Secretary, Tenders Committee, N.Z. Electricity Dept., Wellington. B.o.T. (ESB/25097/60).*

15 Feb., 1961.—Australia. 13 34/34/68 MVA 16/16/200 kV s.-ph. 346 kV line transformers. Superintendent of Stores and Supply, Snowy Mountains H.E. Authority, Box 332, Post Office, Cooma North, N.S.W. B.o.T. (ESB/25386/60).*

CONTRACTS PLACED

E. Anglian Hospital Board. Electrical and lift installations at West Suffolk General Hospital, Bury St. Edmunds, Norwich Electrical Co. Ltd., £7,633; and Evans Lifts, £3,740, respectively. Provision of stand-by generator and electrical work at St. Michael's Hospital, Mann Egerton and Co. Ltd., £1,815. Electrical work in Fubourn Hospital, Cambridge, new boiler house, Mann Egerton and Co. Ltd., £1,406. Recommended.

Hartlepool T.C. Electrical installations in 56 houses, John Westmorland and Co., £2,092.

Leicester. Provision of goods/passenger lift at Royal Infirmary for Sheffield Hospital Board, Etchells, Congleden and Muir Ltd., £2,049.

Longbenton U.D.C. Supply and erection of 133 sodium vapour main road units and 21 100 W filament units, Engineering and Lighting Equipment Co. Ltd.

Newcastle-on-Tyne C.C. Electrical installation, alterations and additions at Stocksfield Ave Primary and Silverhill School, Mitchelson (Electrical) Ltd. Recommended.

Northumberland C.C. Electrical works in schools: Somervyl Primary, A. E. Jamison Ltd., £212; Longbenton C.E. Controlled, I. and E. Morton, £453; Newburn Manor Primary, Bonham Electrical Co., £276; and in Stannington Children's Hospital, G. S. Akinhead, £469 10s. Recommended.

Sheffield T.C. Lighting and power installation at Oaks Water Tower, Yorkshire E.B., £1,188. Recommended.

Welwyn Gdn City D.C. Supply and erection of 41 Group "A" tubular steel columns complete with lanterns/gear for N.W. Development Area "N," Abacus Municipal Ltd.

Wortley R.D.C. Street lighting (Schemes 54 and 57): Ecclesfield 67, Chapeltown to High Green, 74 125 W m.v. on 20 ft columns, Concrete Utilities Ltd.; (Scheme 55) Stannington, 60 80 W on 15 ft columns; (Scheme 58, pt. 1) Chapeltown, 29 250 W lamps on 25 ft columns, A.E.I. Lamp and Lighting.

TRADE NOTES

Agreement. Blackburn Electronics Ltd., a manufacturer of digital data handling equipment, announce that agreement has been reached between themselves and the Clary Corporation of U.S.A., for the marketing, in Gt. Britain, of the range of Clary printers and arithmetic centres.

Australian Tariffs. The Australian Minister for Trade has asked the Tariff Board to inquire into and report on whether additional assistance should be given to local producers of electro-mechanical domestic appliances with self-contained motors, such as vacuum cleaners, floor polishers and floor scrubbers. At the present time these carry a British preferential duty of 25% *ad valorem*. Any U.K. firm proposing to submit evidence should notify the Australian authorities by 12 Oct.

Ceylon Tariffs. Among items for which revised import duties are specified are vacuum and pressure gauges, pressure switches and float switches, for which the preferential rate becomes 2½% *ad valorem*, and the general rate 12½%.

Change of Name. The title of Zeta Domestics Ltd. has been changed to Gay-Day (Domestics) Ltd.

London office. The Key Engineering Co. Ltd. have opened a new London office at 2 Caxton St, S.W.1. Telephone: Abbey 4860. Mr I. K. Robinson is handling all technical and sales inquiries there.

BUSINESS PROSPECTS

Addington. Royal Warehousemen, Clerks and Drapers' Schools, Russell Hill School, Purley, Surrey, plan £¼ million new school at Ballards, Addington, and scheme for modifications at existing school at £450,600.

Ashby R.D.C. 12 houses planned for Appleby Magna and nine for Measham. Surveyor.

Birmingham T.C. Tender: 20 Hollybank Rd bungalows and 11 two-storey dwellings, Adams Hill. Architect.—Tender: 27 four-storey dwellings, Tessall La; eight four-storey dwellings, Pool Farm estate. Architect.

Berwick. Tender: Ward block and physiotherapy dept., Berwick Infirmary, for Newcastle Regional Hospital Board. Quantity surveyors: Thomas Barrett, Sons and Ptnrs, High Bridge, Newcastle.

Blaby R.D.C. 92 dwellings planned in various villages for 1961. Surveyor, Shepshed.

Blackburn. D. Thwaites and Co., Blackburn, plan brewhouse and steam raising plant at Syke St, Cleaver St, etc.—Fox (Warehousing) Ltd. plan rear Hodson's St warehouse.

Bolton. The Bleachers' Association plans extensions on Back Bury Rd land.

Bracknell. Extensions planned to factories of Racal Co., of Bracknell; Secomastic, Western Rd; A.E.A. Engineering, Western Ave; and Lennie and Thorne, Western Rd. Corporation Architect.

Bradford. Leeds Regional Hospital Board plans 600-bed hospital at Horton Green to cost £3¼ million.—Remodelling of St. Luke's and St. Luke's Maternity Hospital planned.

Brandon (Co. Durham). Plans by C.W.S. Architects' Dept., 90 Westmorland Rd, Newcastle-on-Tyne, for distribution depot at Langley Moor for East Durham Co-operative Dairies.

Brighton. Horsell Electrics, 47 Hollingdean Rd, plan new factory.

Bury. Walker Chemical Co. plan new production building at Fernhill Chemical Wks.

Bury St. Edmunds. Fuller, Hall and Foulsham, 212 High Holborn, W.C.1, architects for 70,000 sq ft factory building for Barber-Greene, Olding and Co., Hatfield.

Cardiff. Turriff Construction Corpn., Bedbrooke Rd, Warwick, contractors for Guest Keen Iron and Steel Co. conversion of old offices into laboratories, at East Moor.

Coventry T.C. Tender: Laundry in Livingstone Rd. Architect.

Cumberland C.C. Tender: Additional hostel accommodation at Newton Rigg Farm School, Penrith, and alterations and additions to Thornhill Primary School, Egremont. Acting County Architect: H. R. Clark, 15 Portland Sq, Carlisle.

Eastleigh B.C. Tender: 30 Velmore Housing Estate bungalows, Stage 10. Engineer.

Edinburgh T.C. Tender: Contract 8, 236 houses; Contract 10, 49 houses. Architect.

Evesham. Willmott's, Swan La, plan factory extensions on Conduit Hill land.

Grantham B.C. Tender: 101 houses. Surveyor.

Harrogate. Taylor, Brown and Miller, 8 Victoria Ave, architects for James Coombes and Co.'s planned Grove Park Terr premises.

Hornchurch U.D.C. Tender: 233 houses in two contracts. Engineer and Surveyor.

Houghton-le-Spring. Conversion of Coliseum Cinema, Newbottle St, into shop premises for Howard Collings Group of Companies. Architect: Ivor Hodges, L.R.I.B.A., 10 Gray's Inn Sq, London W.C.1.—Isaac Berriman, Fence Houses, propose housing developments at North View; similar developments are planned at Quarry Rd and Station Rd, Shiney Row, for William Leech Ltd., builders, St. James St, Newcastle-on-Tyne.

Hull T.C. Tender: 54 dwellings, Greenwood Ave area. Architect.

Irvine. Skefko Ball Bearing Co., Leagrave Rd, Luton, plan factory.

Jarrow-on-Tyne. Smart and Brown (Machine Tool) Biggleswade, Beds, plan new factory.—H. Mullins, Bede Trading Estate, Jarrow, plan Curlew Rd factory.—Smith Gore and Co., 81 Bondgate, Darlington, plan housing developments on seven acres at Hedword Town Farm.

Kilmarnock. Industrial Estate Management Corporation for Scotland plan £95,720 factory, Abbotsford Rd.

Leominster B.C. Tender: 25 bungalows, laundry, bedroom block, community centre on Sydonia site. Surveyor.

Liverpool T.C. Tender: 1,639 dwellings on various sites. Architect.

London, E. Frederick E. Jones, 6 Gray's Inn Sq, W.C.1, architect for Bernard Dula Ltd new factory at High St, Stratford, E.15.—W. Bridges and Co., 37 Parliament St, S.W.1, consulting engineers for Osborne St, E.1, factory planned by Carnegie Models Ltd., 48 Gt. Portland St, W.1.—Marshgate Investment Co., 22 Marshgate La, E.15, plan two factories there.—Toc H (Incorporated), 15 Trinity Sq, E.C.3, plan £100,000 hostel at Church Cres, E.9; architect: F. W. Holder, Gt. Westminster Hse, Horseferry Rd, S.W.1. **E.C.** Carl Fisher and Associates, 56 Portland Pl, W.1, architects for five-storey Charterhouse Bldgs site building, E.C.1.—Lewis Solomon, Kaye and Ptnrs, Thavies Inn Hse, Holborn Circus, E.C.1, plan nine-storey office block near 35-43 Poultry and 1-6 Old Jewry, etc., E.C.2.—Ley, Colbeck and Ptnrs, Palmerston Hse, Bishopsgate, E.C.2, architects for planned demolition and rebuilding of St. Clement's Hse, Clement's La.—Bernard Gold and Ptnrs, 45 Savile Row, W.1, architect for 19-storey office building at Wood St and the dual carriageway section of London Wall. **N.W.** Devereux and Davis, 3 Gower St, W.C.1, architects for 16-storey building at Euston Rd, Chalton St, etc., for central hall library, offices, clinic, etc. **S.W.** S.W. Metropolitan Regional Hospital Board plan extensions to St. Stephen's Hospital. Board's architect: R. F. M. Mellor, 76 Wimpole St, W.1.—Sir Giles Gilbert-Scott, 9 Gray's Inn Sq, W.C.1, architect for £¼ million extensions planned for Whitelands Training Centre for Women Teachers, West Hill, S.W.15. **W.C.** H. V. Ashley and Winton Newman, 3 Verulam Bldgs, Gray's Inn, W.C.1, architects for showrooms and offices, 294 High Holborn, **S.E.** William J. Harvey, 334 Dollis Hill La, N.W.2, architect for factory, warehouse, etc., at Ormside St, Camberwell, S.E.15.—H. Fitzroy Robinson and Ptnrs, 3 Gray's Inn Sq, W.C.1, architects for 400 ft high office block planned for 80-85 Albert Embankment. **W.** C. H. Elsom, 10 Lower Grosvenor Pl, S.W.1, architect for shops and offices at 97-99 Baker St, W.1.

Middlesbrough. E.C. scheme for £745,000 extensions to Constantine Technical College. Plans for additions to Easterside Primary and Langbaurgh Secondary Schools. Education Architect.

Newcastle T.C. New central library planned for £485,000 at Higham Pl and Saville Pl. Architect.—H. Faulkner Brown, 16 The Grove, Gosforth, architect for St. George's Cres branch library for T.C.—M. of Civil Aviation approves T.C.'s plans for £¼ million extensions of Woolsington Airport terminal building.—Waring and Netts, 1 Lansdown Terr, Gosforth, architects for showroom, restaurant, offices and warehouse, Low Friar St, for D. Levey.—St. Andrews Motors Ltd., St. Andrews Bldgs, Gallowgate, plan showrooms/offices, 53 George St. Architects: M. and H. Gatoff, 26 Mosley St.—The Norwich Union Insurance Soc. Ltd., Norwich, plan alterations to 89-91 Jesmond Rd for offices and flat.—Plans for factory extensions at Water St and Penn St for Austin Lifts by Tasker and Ptnrs, 25 New Bridge St.—David Brown, 10 Lambton Rd, Jesmond, architect for R.C. secondary school, Benwell Village.—Plans by Mauchlen, Weightman and Elphick, 12 Saville Row, for extending residential flats at 105-14 West View.

Newport, I.o.W. Mews Block Co., Trevor Rd, plan factory extensions.—Hooper and Ashby Ltd., Medina Ave, plan warehouses.

Northampton R.D.C. New council chamber and offices, Billing Rd, planned. Surveyor.

Northants T.C. Additional hall and dining room planned at Wollaston Secondary Modern School. Architect, Northampton.

North Riding C.C. Tender: Branch library, Skelton-in-Cleveland. Architect.

Nottingham. Modernisation of General Hospital planned to include new multi-storey block, Sheffield Hospital Board, Old Fulwood Rd, Sheffield.

Notts. National Coal Board plan pithead baths at Hucknall Colliery.

Nuneaton T.C. New £80,158 central library planned. Surveyor.

Oban T.C. Tender: 175 houses on Corran Brae Housing Development, Stage 2. Clerk.

Old Fletton, Hunts. 47 bungalows on private Park Farm estate planned by C. W. Shelton, Stanground, Peterborough.—U.D.C. Tender: 74 houses and garages off Southfields Drive and eight bungalows, Stanground. Surveyor.

Oxford. Hunt and Broadhurst, Botley Rd, plan use of land at rear Ideal Wks for industrial purposes.

Peterborough T.C. Block of flats planned, St. Mary's St slum clearance area. Surveyor.—Five new laboratories, four classrooms, art room, kitchen and dining hall planned by Governors of King's School for 1962.

Portsmouth. Graham Tatford, 1 Milford Rd, Portsmouth, plan warehouse and offices, 136 Kingston Rd.—Portsmouth Trading Co., Old Rd, Cosham, plan breeze block manufactory on 2¼-acre site, Fitzherbert Rd, Farlington.—L. Chandler, The Shrubbery, Grove Rd South, Southsea, Hants, architect for warehouse, offices, etc., at Cosham for Collis and Co. (Tobacco) Ltd.

Reading. District Hospital Management Committee plans new £300,000 opthalmic block next to Royal Berkshire Hospital.

Rochdale. Mellowhide Products, Molesworth St, Rochdale, plan new factory.—*Rochdale Observer* plans new premises for newspaper production and printing at Drake St.

Scarborough. Moor and Robsons Breweries plan industrial premises on Queen Margaret's Rd site.

Seaham. Durham Coal Board (No. 2 area), Stockton Rd, Sunderland, plans new health centre at Dowdon Colliery.

Sheffield. Stanley Works (Gt. Britain), Rutland Rd, plan new wood and metal finishing departments in Woodside La.

Shepshed U.D.C. 26 houses planned. Surveyor.

Shrewsbury. Brixton Development Co., 22 Eley Pl, E.C.1, plan 17 factories on Harlescott factory estate.

Southall. Tooley and Foster, Midland Bank Chmbrs, Queen's Rd, Buckhurst Hill, Essex, architects for £100,000 erection of new admission ward block at St. Bernard's Hospital.—A.E.C. plan £100,000 chassis inspection block, Windmill La.

Southampton B.C. Tender: Contract B356, 95 houses, Thornhill estate; B354, four houses, Glover Rd, Millbrook; B357, 140 flats in seven five-storey blocks, Thornhill estate. Engineer.

Stalybridge. George Crabtree plan works extensions at Shepley St.

Stockton-on-Tees T.C. Tender: Hardwick infants' school. Borough Architect.

Suffolk and Ipswich Fire Authority. Tender: New Colchester Rd fire station. Architects: Johns, Slater and Haward, 32 Foundation St.

Sunderland. Corporation Seaside Developments Committee plans scheme for new hall at Seaburn for exhibitions, etc. Borough Architect, Grange Hse, Stockton Rd.—C. Soloman, 30 St. Mary's Pl, Newcastle, architect for Hadrian Supply Co.'s self-service centre at Northumberland St.—Tenders to

Business Prospects—continued

be invited by E.C. for additions to teachers' training college.—E.C. has £45,000 alterations scheme for Sunderland Technical College.—S. W. Millburn and Ptnrs, 9 Esplanade, architect for R. Rowley and Sons' engine works extensions, St. Mark's Rd, Millfield.—G. T. Brown and Son, 14 Grant Terr, Stockton Rd, architects for Northern Laundry Ltd. carpet cleaning department at Back Rossley St.

Sutton and Cheam. Industrial estate planned at rear of Sutton sewage farm.

Swindon. Tucker and Huntley, 10 Old Brompton Rd, S.W.7, quantity surveyors for Linton and Hurst factory.

Trowbridge. McCall Bros., Upper Mills, plan new Cradle Bridge mill factory.

Wallingford. Alan K. Bray, 13 Wensley Ave, Cottingham Rd, Hull, architect for extension of Associated Maltsters kiln and silos at the Maltings, St. John's Rd.

Wem U.D.C. Tender: Two three-storey blocks of flats, Lowe Hill Rd housing development. Biggins and Assoc., architects, Richmond Hse, 123 Houghton, Chester.

West Kesteven R.D.C. W. Dobie and Sons, Barkston, Grantham, contractors for bungalows at Barkston to cost £8,412.

Weston-super-Mare B.C. Tender: Two factories, one 22,948 sq ft one-storey, with a two-storey front building; the other, 8,042 sq ft of similar construction. Clerk.

Worthing. Worthing Hospital Management Committee plans £130,000 extension to Worthing Hospital, £20,000 extension at Zachary Merton Maternity Hospital, Rustington, and £26,500 at Southland Hospital, Shoreham.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

G. Alexander and Partners Ltd., 52 Brook St, W.1. Electrical, mechanical, electronic, aeronautical, marine, motor, consulting and general engineers, etc. Nom. cap.: £100. Dirs.: Gerald Alexander, Alfred J. Spenser-Morris and John Alexander.

Bendor Lampshades Ltd., 183a Field End Rd, Eastcote, Pinner. Nom. cap.: £100. Permanent dirs.: George R. S. Cusins and Wm. B. Grieve.

A. Cleasby Ltd., 196 Deansgate, Manchester. Electrical engineers, etc. Nom. cap.: £1,000. Dirs.: Arthur F. Cleasby, Arthur J. Cleasby, Pauline Cleasby and Lucy Cleasby.

J. W. Collins and Sons (Hassocks) Ltd., New Pl, Keymer, Sussex. Electrical engineers and contractors, etc. Nom. cap.: £100. Dirs.: Joseph W. Collins, Ethel V. Collins, Peter J. Collins and Joseph M. Collins.

Cordless Hearing Aid Correctors Ltd., 13 St. Georges Rd, Formby, Lancs. Nom. cap.: £100. Dirs.: Robert E. Shelmerdine, Sheila F. Innocent, Irene Shelmerdine and Roy L. Innocent.

Elesonic Ltd. Manufacturers of and dealers in electrical goods, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: James Noone, 68 Adley St, E.5; and Emmanuel Solomons, 94 Queenborough Gdns, Ilford.

J. Flack Ltd., 139 Church Rd, N.W.10. To take over business of a wholesale electrical distributor and radio factor carried on at Willesden by J. Flack, etc. Nom. cap.: £2,000. Permanent dirs.: Jack Flack and Mrs A. Flack.

W. S. Gidney Ltd., 72 Watling St, E.C.4. Electrical equipment specialists, etc. Nom. cap.: £100. Dirs.: William A. S. Gidney and George M. Baron.

I.F.C. Ltd., 48 Market Pl, Reading. Dealers in electrical appliances, etc. Nom. cap.: £100. Dirs.: George S. Leathwood and Jan de Jong.

W. A. Kirkby and Co. (Sales) Ltd., 9 Reform St, Hull. Electrical contractors and engineers, etc. Nom. cap.: £5,000. Dirs.: Kilda Kirkby and Wilbert A. Kirkby.

Ladbroke Electronics Ltd., 96 Dawes Rd, Fulham, S.W.6. Nom. cap.: £100. Dirs.: Frederick A. M. Jones and Sylvia L. Jones.

1001 Lamp Co. Ltd. Distributors, merchants, manufacturers of and dealers in adjustable electric table lamps, etc. Nom. cap.: £10,000. Dirs.: Jac Jacobsen, Rolf Sollie and Jon Brambani. Subs.: John W. Sharman, 50 Whitelands Ave, Chorleywood; and Roger W. Lilley, Woodlands, Little Orchard Way, Shalford, Guildford.

Northern Aluminium Co. Ltd. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: S. E. Clotworthy, "Kemano," East Rd, St. Georges Hill, Weybridge; and A. A. Bruneau, Bush Hse, Aldwych, W.C.2.

Rayford Electrics Ltd., 32 Sydney St, Brighton 1. Dealers in washing machines, etc. Nom. cap.: £1,000. Permanent dirs.: John Milford and Raymond Y. F. Horney.

A. Rye and Son (Electrical) Ltd., The Street, Wickhambreaux, nr. Canterbury, Kent. To take over business of an electrical contractor carried on at Wickhambreaux by A. Rye, etc. Nom. cap.: £1,500. Dirs.: Arthur Rye, David Owen and Sidney R. S. Waghorn.

Basil Spence and Co. Ltd., 6 Surrey St, W.C.2. Manufacturers of and dealers in vacuum cleaners, etc. Nom. cap.: £2,000. Dirs.: to be appointed by subs. Subs.: Stanley H. Lucas and Francis A. Dean.

Stainforth Electrical and Plumbing Co. Ltd., 13 Silver St, Stainforth. To take over the business carried on by D. J. Humphreys at Finkle St, Stainforth, etc. Nom. cap.: £1,000. Dirs.: Harry Dyson and David J. Humphreys.

Wyman and Archer Ltd. Manufacturers of and dealers in dynamos, motors, etc. Nom. cap.: £1,000. Dirs.: James Wyman and Arthur Geo. Archer. Subs.: Lancelot H. Twaytes and James C. Fenwick, 5-6 Clement's Inn, W.C.2.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Anatrol. 800,139. Class 9. Apparatus, etc. De Havilland Propellers Ltd., Manor Rd, Hatfield, Herts.

Atmalloy. 803,280. Class 6. Metal alloys, etc. Automatic Telephone and Electric Co. Ltd., Strowger Wks, Liverpool 7.

Blacon. 803,644. Class 9. Conduit and fittings made of plastics. F. C. Blackwell and Co. Ltd., Musker St, Endbutt La, Crosby, Liverpool.

Clade. 796,896. Class 9. Apparatus, etc. Richard Lonsdale-Hands Associates Ltd., Commonwealth Hse, 1-19 New Oxford St, W.C.1.

Decca Debonaire. 802,963. Class 9. Radio receivers, etc. Decca Record Co. Ltd., 9 Albert Embankment, S.E.11.

Iced Diamond. 801,727. Class 11. Refrigerators and refrigerating apparatus. A.E.I.-Hotpoint Ltd., 33 Grosvenor Pl, S.W.1.

Ismay. B775,513. Class 11. Lamps. Ismay Lamps Ltd., Roden St Wks, Ilford.

Lido. 798,124. Class 11. Water heaters, etc. Heatrae Ltd., Heatrae Wks, St. George's St, Norwich.

Permabel. 801,154. Class 11. Heating apparatus for use in hair waving appliances. Perma, 29 bis, rue d'Astorg, Paris, France.

Photocrescenta, Attralux and **Altrilux.** 804,643/5. Class 11. Lighting installations, etc. Philips Electrical Ltd., Century Hse, Shaftesbury Ave, W.C.2.

Spacelite. 788,017. Class 11. Lamp bulbs. Luxram Electric Ltd., 72 Gt. Eastern St, E.C.2.

Stephone. 805,779. Class 9. Sound transmitting apparatus, etc. Steven and Struthers Ltd., Eastvale Pl, Kelvinhaugh, Glasgow C.3.

Gazette Announcements

BANKRUPTCY ACTS

Receiving Orders

Blackpool. G. Smethurst, electrical dealer, formerly carrying on business at 15 Bowness Ave, Mereside, and at 178 Weston Rd, Blackpool. Receiving order dated 22 Sept.

Cardiff. R. P. Harris, electrician, of 68 Page St, Grangetown. Receiving order dated 22 Sept.

Gloucester. A. C. J. Franklin, electrical engineer, of 142 Southgate St. Receiving order dated 21 Sept.

Blackwood, Tredegar. P. Talbot, radio, television and electrical goods retailer, carrying on business at 100 Bailey St, Brynmawr, Brecon, and at 19 Somerset St, Abertillery. Receiving order dated 26 Sept.

Stafford. Owen and Shaw, electrical contractors, carrying on business at Corner Shop Cross Rds, Hexion. Receiving order dated 23 Sept.

Release of Trustees

Ashton-under-Lyne. D. R. Kemp, electrical contractor, formerly carrying on business as Batty and Jackson, at 15 Farnsworth Ave and North Mill, Katherine St. Trustee: J. Tye, 20 Byrom St, Manchester 3, released as from 13 Sept.

Huddersfield. A. Moore, builder, contractor and electrician, formerly carrying on business at 5 Upper Hirst, Outlane, Huddersfield, and 12 Hay Gate, Mount, Outlane. Trustee: F. L. Kilby, 27 Bradford Rd, Brighouse, Yorks, released as from 5 Aug.

Applications for Discharge

High Court of Justice. G. W. May, electrical contractor, lately carrying on business at 2A First St, Chelsea, S.W.3. Application for discharge to be heard at Bankruptcy Bldgs, Carey St, W.C.2, on 4 Nov., at 11 a.m.

Swindon. F. Kirk, electrical, radio and calor gas engineer, formerly carrying on business at 11 Railway St, Pocklington. Application for discharge to be heard at County Court Bldgs, Clarence St, Swindon, on 12 Oct., at 11 a.m.

Dividend

Halifax. L. Filby, radio, television and electrical engineer, carrying on business in co-partnership as Filby and Brown at 44 Park St, Brighouse. Dividend per £: 6s 6d, payable at Official Receiver's Office, 20 North Parade, Bradford 1, on 11 Oct.

COMPANIES ACTS

Norman Electrics Ltd. Creditors to send details to liquidator: K. R. Cork, 19 Eastcheap, E.C.3, by 19 Oct.

Hill's Enterprises Ltd. Meetings of creditors and contributories to be held at Official Receiver's Office, Somerset Hse, 37 Temple St, Birmingham 2, on 7 Oct., at 11 and 11.30 a.m., respectively.

W.E.K. (Electrical) Ltd. Last day for receiving proofs for intended dividend: 15 Oct., to liquidator: J. M. M. Torquil, 4 Bucklersbury, E.C.4.

Capel Electrical and Radio Co. Ltd. Creditors to send details to liquidator: C. R. Watson, 124 High St, Dorking, by 21 Oct.

Sefton Electrics Ltd. Creditors to send details to liquidator: R. P. Booth, 5 Rumford Pl, Liverpool 3, by 1 Nov.

Morbury Electricals Ltd. Liquidator: W. H. Meredith, County Court Bldgs, Westgate St, Cardiff, released as from 6 Sept.

Elizabethan Eng. Co. Ltd. Meeting of creditors to be held at Room 47, Winchester Hse, E.C.2, on 12 Oct. at 12 noon.

MEETINGS TO NOTE

THURSDAY, 6 OCT.

I.E.E. Presidential address, Sir Hamish D. MacLaren, Savoy Pl, W.C.2. 5.30 p.m.

CHELMSFORD ENGINEERING SOCIETY. Presidential address. Social Hall, Hoffman's. 7.30 p.m.

A.S.E.E. (Brighton, Hove and District). "Weather Forecasting," R. G. Veryard. New Imperial Hotel, 1st Ave, Hove. 7.30 p.m.

I.E.S. (Nottingham). Chairman's address. Electricity Centre, Carrington St. 6 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (S. Western). Convention on "Aviation Electronics and its Industrial Applications" until 7 Oct. College of Science and Technology, Ashley Down Rd, Bristol.

BRITISH INSTITUTION OF RADIO ENGINEERS (Scottish). "Technical Education for the Radio and Television Industry," J. B. Rimmer. Institution of Engineers and Shipbuilders, 39 Elmbank Cres, Glasgow. 7 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (N. Western). "V.H.F. FM/AM Transistor Receivers," L. E. Jansson. Reynolds Hall, Manchester College of Science and Technology, Sackville St, Manchester. 7 p.m.

I.E.E. (Cambridge Electronics and Measurement Group). Chairman's address, "Design Processes for Electronic Equipment," H. V. Beck. Cavendish Laboratory. 8 p.m.

I.E.E. (N. Scotland). Centre chairman's address, R. B. Daniel, Dundee.

I.E.S. (Glasgow). "Exterior Lighting for Buildings," L. C. Rettig and H. Baker. British Lighting Council, 29 St. Vincent Pl. 6.30 p.m.

FRIDAY, 7 OCT.

I.E.E. (Medical Electronics Group). Discussion, "Nerve Endings." Savoy Pl, W.C.2. 6 p.m.

I.E.E. (N. Staffs). Chairman's address, G. H. Gillam, N. Staffs Technical College, Stoke-on-Trent. 7 p.m.

A.S.E.E. (Liverpool and District). "A.C. Distribution Equipment for Ships," M. J. Bolton. Industrial Development Centre, M.A.N.W.E.B., Paradise St. 7.30 p.m.

A.S.E.E. (Sheffield). Dinner/dance. Kenwood Hall.

A.S.E.E. (Stoke and Crewe). Annual dinner. Grand Hotel, Hanley.

SOCIETY OF INSTRUMENT TECHNOLOGY (Fawley). "The Basic Principles of Digital Instrumentation," D. S. Evans. Admin. Bldg, Esso Refinery. 5.30 p.m.

I.E.S. (Leeds). Chairman's address. British Lighting Council, 24 Aire St, 6.15 p.m.

I.E.E. (N. Scotland). Centre chairman's address, R. B. Daniel. Aberdeen.

MONDAY, 10 OCT.

I.E.E. (E. Anglia). Chairman's address, "Electricity in the Service of Mankind," E. A. Fowler. Cavendish Laboratory, Cambridge. 6.30 p.m.

I.E.E. (N. Eastern). Chairman's address, D. H. Thomas, Neville Hall, Westgate Rd, Newcastle upon Tyne. 6.15 p.m.

I.E.E. (S. Midlands Supply and Utilisation Group). "A Basis for Short-Circu t Ratings for Paper-insulated Cables up to 11 kV," L. Gosland and R. G. Parr. College of Technology, Gosta Green. Birmingham. 6 p.m.

I.E.E. (Western). Chairman's address, A. C. Thirtle. Bristol University. 6 p.m.

I.E.E. (N.W. Graduates and Students). Chairman's address, "Patents and Development in Electrical Engineering," D. F. Binns. Engineers' Club, Manchester. 7 p.m.

A.S.E.E. (Bournemouth and District). "Floor-warming Installations," A. Hind. Grand Hotel, Firvale Rd. 8 p.m.

A.S.E.E. (Central London). "Tidal Models and Their Control," Duncan Taylor. White Hall Hotel, Bloomsbury Sq, W.C.1. 7.15 p.m.

A.S.E.E. (N.W. London). "Development of Motor Control Centres," F. Caesar-Gordon. Century Hotel, Wembley. 8.15 p.m.

INSTITUTION OF PLANT ENGINEERS. "Utilisation of Flash Steam," C. R. Crosse. Royal Society of Arts, John Adam St, W.C.2. 7 p.m.

TUESDAY, 11 OCT.

I.E.E. (Measurement and Control Section). Chairman's address, "Time and Insulation," C. G. Garton. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (N. Midlands). "The Application of Transistors to Line Communication Equipment," H. T. Prior, D. J. R. Chapman and A. A. M. Whitehead. H.Q. Mess, School of Signals, Catterick Camp. 6.15 p.m.

I.E.E. (N.W. Utilisation Group). Chairman's address, "Some Effects of Automation," C. Ayres. Engineers' Club, Manchester. 6.15 p.m.

I.E.E. (N. Ireland). Chairman's address, "Electricity and the Ulster Farmer," J. McA. Irons. Civil Engineering Department, David Keir Bldg, Queens University, Belfast. 6.30 p.m.

I.E.E. (Scottish Electronics and Measurement Group). Chairman's address, J. Stewart. Carlton Hotel, North Bridge, Edinburgh. 7 p.m.

I.E.E. (Southern). "The Oral Presentation of Scientific Material," A. Clow. The University, Southampton. 6.30 p.m.

I.E.E. (London Graduates and Students). Chairman's address, "Southern Region, Kent Coast Electrification Scheme—Power Supply Apparatus," A. Porter. Medway College of Technology, Chatham. 7 p.m.

I.E.S. Presidential address, "Lighting and Research," W. S. Stiles. Royal Institution, Albemarle St, W.1. 6 p.m.

A.S.E.E. (Aldershot and Districts). "Electronic Control Apparatus," Dr Fletcher. Queen's Hotel, High St. 8 p.m.

A.S.E.E. (Chester and District). "Electricity Supply Distribut on Network," Westminster Hotel, City Rd. 7.45 p.m.

A.S.E.E. (E. Kent). "The Richborough Generating Station," H. W. Le-Grys, County Hotel, Canterbury. 8 p.m.

A.S.E.E. (Glasgow). "Heavy Industrial Control Gear," C. V. Curran. Kenilworth Hotel, Queen St. 8 p.m.

A.S.E.E. (Portsmouth and District). "Industrial Law." Committee Room, Ministry of Labour Offices, Lake Rd. 7.30 p.m.

A.S.E.E. (S. Wales). "The Organisation of Industrial Electrical Maintenance," S. R. A. Phelps. Park Hotel, Park Pl, Cardiff. 7.30 p.m.

A.S.E.E. (York). "Electrical Control of Oil and Gas Burners," D. Stretton-Smith. Royal Station Hotel. 7.30 p.m.

BRITISH INSTITUTE OF MANAGEMENT. Fifteenth National Conference at Harrogate until 13 Oct.

WEDNESDAY, 12 OCT.

I.E.E. (Education Circle). Discussion: "Laboratory Work for the Part III Examination. Savoy Pl, W.C.2. 6 p.m.

I.E.E. (N. Lancs). Chairman's address, C. C. Bacon. N.W.E.B. Demonstration Theatre, Friargate, Preston. 7.15 p.m.

I.E.E. (S. Midlands Graduates and Students). Chairman's address, K. Gunary. James Watt Memorial Institute, Birmingham. 6.30 p.m.

I.E.E. (Rugby). Chairman's address, E. S. Hall. Rugby College of Technology and Arts. 6.30 p.m.

I.E.E. (Oxford). "Some Engineering Problems on Nimrod," P. Bowles. District Offices, Southern Electricity Board, 37 George St, Oxford. 7 p.m.

A.S.E.E. (Birmingham). "The Provisions of Adequate Electrical Installations in Buildings—Small Industrial Premises," J. A. Sharp. Exchange and Engineering Centre, Birmingham 2. 7.30 p.m.

A.S.E.E. (Leicester). Haldane Regional Lecture: "Electricity from Water Power and Pumped Storage, M. Braikevitch. Edward Wood Hall, London Rd. 7.30 p.m.

A.S.E.E. (Luton). "Panelec Floor-warming and Ancillary Equipment," D. W. Ackery. Luton College of Technology, Park Sq. 8.15 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (W. Midlands). "Electrical Synthesis of Music," Alan Douglas. College of Technology, Wulfruna St, Wolverhampton. 7.15 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Electro-Acoustics Group). "Electro-Acoustics for Human Listeners," Professor Colin Cherry. London School of Hygiene and Tropical Medicine, Keppel St, Gower St, W.C.1. 6.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Manchester). "Data Handling and Processing," E. K. Robertson. College of Science and Technology, Sackville St. 6.45 p.m.

WOMEN'S ENGINEERING SOCIETY. "The Use of Microwaves in Telecommunications," J. Rice. Hope Hse, 45 Gt. Peter St, S.W.1. 7 p.m.

THURSDAY, 13 OCT.

I.E.E. (Utilisation Section). Chairman's address, "Developments in Electrical Plant for Industry," J. M. Ferguson. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Southern). "The Measurement of Time," L. Essen. S. Dorset Technical College, Weymouth. 6.30 p.m.

I.E.E. (West Wales). Chairman's address., J. Nelsey. Conference Room, S. Wales Electricity Board, Kingsway, Swansea. 6 p.m.

I.E.E. (Southern Graduates and Students). Chairman's address, "A Review of Modern Computing Elements," R. E. Hayes. The University, Southampton. 6.30 p.m.

INSTITUTION OF PRODUCTION ENGINEERS (S. Western). "Introduction to Milwaukee-Matic," A. Tack. Technical College, Brunswick Rd, Gloucester. 7.30 p.m.

COUNCIL FOR PRESERVATION OF RURAL ENGLAND. National Conference for Preservation of the Countryside at Weymouth until 15 Oct.

FIRST ELECTRICAL ENGINEERS' EXHIBITION DINNER. Grosvenor Hse, London.

A.S.E.E. (Bradford and District). "Further Discussion on the I.E.E. Regulations," J. L. Browell and H. F. Smith. Midland Hotel. 7.30 p.m.

A.S.E.E. (S.W. London). "Recent Developments in Luminescent Light Sources." Thorn Hse, Upper St. Martin's La, W.C.2. 8 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Teesside). "The Errors of Instruments—Their Study and Importance." H. Kenney. Cleveland Scientific and Technical Institute, Corporation Rd, Middlesbrough. 7.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Liverpool). "Any Questions." M.A.N.W.E.B. Industrial Development Centre. 7 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Control Section). "Transistor Switches in Monitor and Control Systems," W. A. Ross. Manson Hse, 26 Portland Pl, W.1. 7 p.m.

I.E.S. (Manchester). "Lighting Journey Down the Rhine." E. J. Smith. Demonstration Theatre of N.W.E.B., Town Hall Extension, Manchester 2. 6 p.m.

HACKBRIDGE HOLDINGS LTD.

Expanding Demand Envisaged

THE 12th Annual General Meeting of Hackbridge Holdings Limited was held on 30 Sept. in London. Mr A. L. Foulger (the Chairman) presiding.

The following is a summary of his circulated statement:

In my last report I emphasised the severe competition in the Home and Export Markets for business with greatly reduced profit margins. Many references have been made elsewhere to this state of affairs and in particular the intense price cutting in the Cable Industry, and as production costs have tended to rise this had a further adverse effect on final results, which fortunately our Organisation is sufficiently diverse to minimise.

Our Group subsidiaries, which have excellent management teams, were able to secure a reasonable share of business during the year ended 31 March, 1960, resulting in a trading profit of £276,777. After providing £116,141 for depreciation and £102,623 for taxation, and crediting post-acquisition profits of a newly-acquired subsidiary of £24,363 there remains the sum of £82,376 available net profit. After payment of net dividends on the Preference and Ordinary Share Capital the sum of £13,470 has been retained by the Group. Consequent upon the revaluation of Fixed Assets and the purchase of subsidiaries, consolidated capital revenue reserves now amount to £1,653,182.

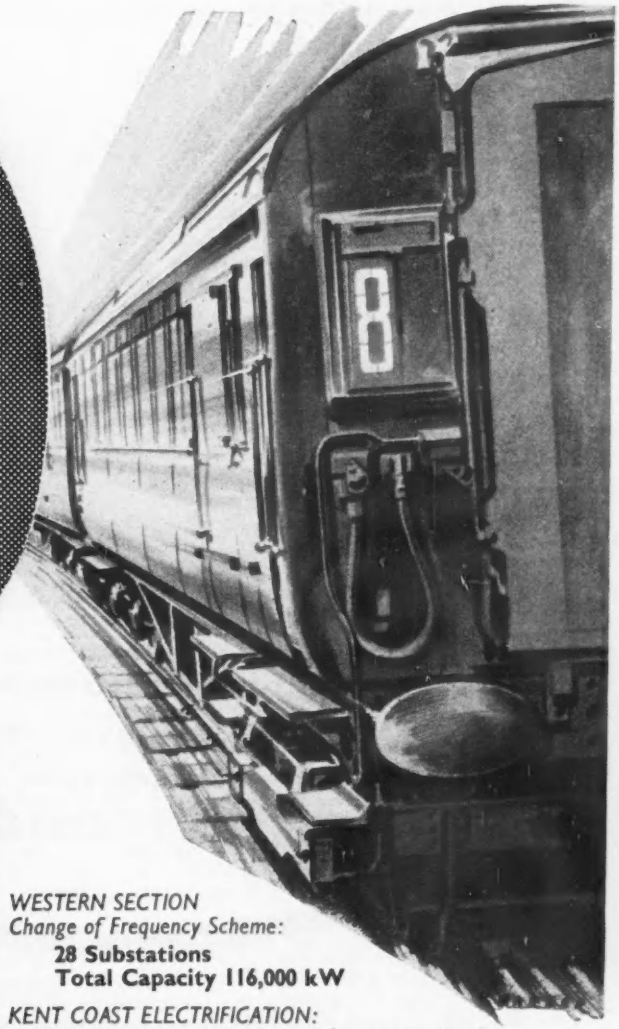
During the year under review we incurred capital expenditure of £70,978 with further commitments of £6,001 outstanding. Your Directors consider there is every reason to expect an expanding demand for our products and that substantial capital expenditure will therefore be justified.

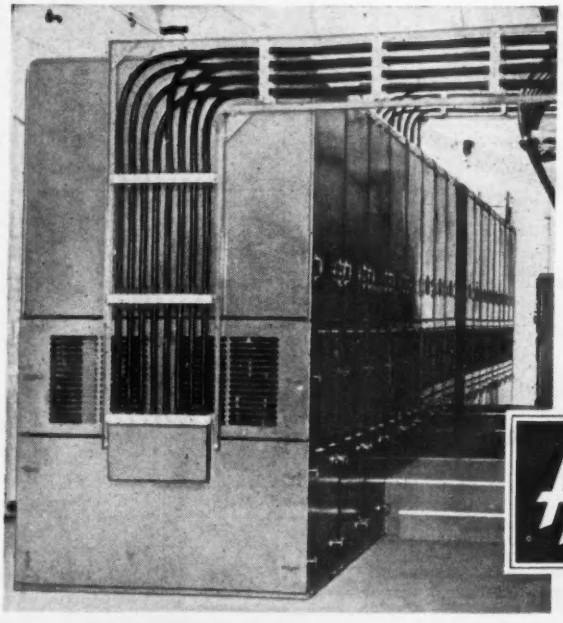
Generally, business is brisk at the present time and our Group order book is substantial. If the demand continues and reasonable profit margins can be achieved, I am confident that we shall obtain reasonably good result again this year.

The report was adopted and the final dividend of 12½% making 20% for the year was approved.

A proposal to increase the authorised capital to £1,700,000 by the creation of a further 3,200,000 Ordinary Shares of 5s each was duly sanctioned.

HEWITTIC RECTIFIERS on BRITISH RAILWAYS SOUTHERN REGION





WESTERN SECTION
Change of Frequency Scheme:
28 Substations
Total Capacity 116,000 kW

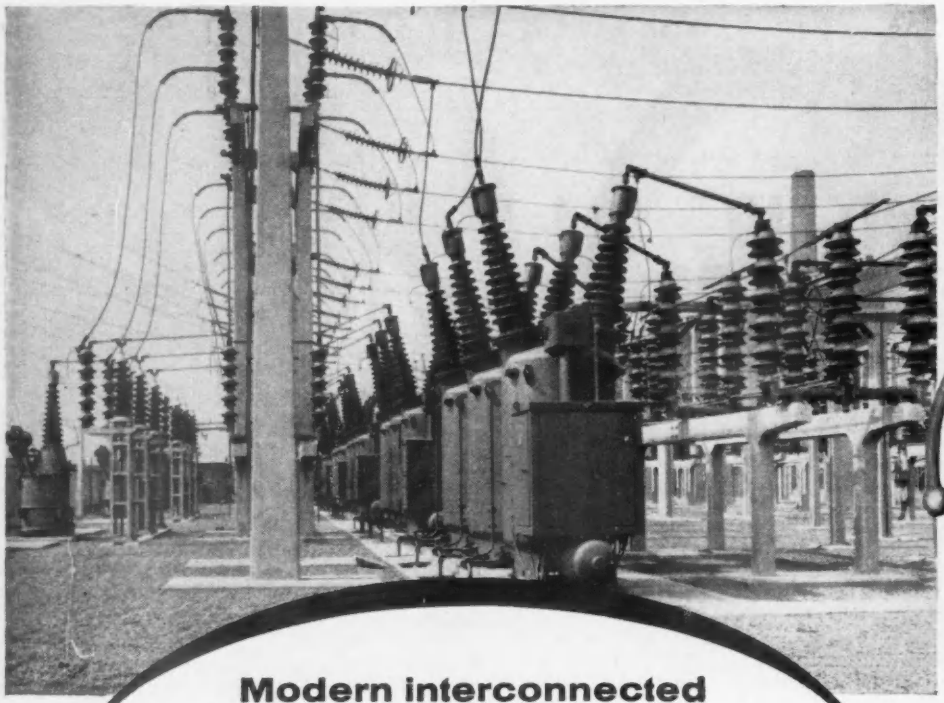
KENT COAST ELECTRIFICATION:
31 Substations (in course of construction)
Total Capacity 82,500 kW

The illustration left, shows two Hewittic Rectifiers forming a 5,000 kW bank in the Dover Substation.

Hewittic Rectifiers

HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES - SURREY - ENGLAND
Telephone: Walton-on-Thames 28833 (8 lines) Telegrams & Cables: "Electric, Walton-on-Thames"

OVERSEAS REPRESENTATIVES: ARGENTINA: H. A. Roberts & Cia., S.R.L. Buenos Aires. **AUSTRALIA:** Hackbridge and Hewittic Electric Co. Ltd., 171 Fitzroy Street, St. Kilda, Victoria; N.S.W.: Queensland: W. Australia: Elder. Smith & Co. Ltd.: South Australia: Parsons & Robertson Ltd.: Tasmania: H. M. Bamford & Sons (Pty.) Ltd., Hobart. **BELGIUM & LUXEMBOURG:** Pierre Pollie, Brussels, 3. **BRAZIL:** Oscar G. Mors, Sao Paulo. **BURMA:** Neonlite Manufacturing & Trading Co. Ltd., Rangoon. **CANADA:** Hackbridge and Hewittic Electric Co. of Canada Ltd., Montreal: The Northern Electric Co. Ltd., Montreal, etc. **CEYLON:** Envee Ess Ltd., Colombo. **CHILE:** Sociedad Importadora del Pacifico Ltda., Santiago. **EAST AFRICA:** G. A. Neumann Ltd., Nairobi. **EGYPT:** Giacomo Cohenca Fils, S.A.E., Cairo. **FINLAND:** Sähkö-ja Konellike O.Y. Hermes, Helsinki. **GHANA, NIGERIA & SIERRA LEONE:** Glyndova Ltd. **GREECE:** Charilaos C. Coroneos, Athens. **INDIA:** Steam & Mining Equipment (India) Private Ltd., Calcutta; Easun Engineering Co. Ltd., Madras, 1. **IRAQ:** J. P. Bahoshy Bros., Baghdad. **MALAYA, SINGAPORE & BORNEO:** Harper, Gilfillan & Co. Ltd., Kuala Lumpur. **NETHERLANDS:** J. Kater, E.I., Ouderkerk a.d. Amstel. **NEW ZEALAND:** Richardson, McCabe & Co. Ltd., Wellington, etc. **PAKISTAN:** The Karachi Radio Co., Karachi, 3 **SOUTH AFRICA:** Arthur Trevor Williams (Pty.) Ltd., Johannesburg, etc. **CENTRAL AFRICAN FEDERATION:** Arthur Trevor Williams (Pty.) Ltd., Salisbury. **THAILAND:** Vichien Phanich Co. Ltd., Bangkok. **TRINIDAD & TOBAGO:** Thomas Peake & Co., Port of Spain. **TURKEY:** Dr. H. Salim Oker, Ankara. **U.S.A.:** Hackbridge and Hewittic Electric Co. Ltd., P.O. Box 234, Pittsburgh 30, Pennsylvania. **VENEZUELA:** Oficina de Ingenieria Sociedad Anonima, Caracas.



Modern interconnected supply systems incorporate AEI SWITCHGEAR

The illustration shows 132-kV, 3500-MVA type "OW.410" oil circuit-breakers recently installed at Skelton Grange "B" Power Station, near Leeds.

These represent the most modern development of a basic design of bulk oil, dead tank oil circuit-breaker, proved through many years of service experience and backed by extensive short-circuit testing.

The breakers incorporate two breaks per phase, each shunted by a linear switching resistor, which ensures equal voltage division between breaks and effectively controls switching overvoltages.

Photograph by courtesy of C.E.G.B. (Yorkshire Division).
Consulting Engineers: Messrs. Merz & McLellan.

For further details of this class of switchgear, write to AEI Switchgear Division, Willesden, London N.W.10, or to your local AEI Office.

AEI **Associated Electrical Industries Ltd.**
Switchgear Division
WILLESDEN, LONDON · TRAFFORD PARK, MANCHESTER · HIGHER OPENSHAW, MANCHESTER

F/A 018

CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

CITY AND COUNTY OF BRISTOL

TENDERS invited for supply of undermentioned materials during the 12 months 1 Jan., 1961, to 31 Dec., 1961.

Electric Lamps, Batteries.
Transformers and Capacitors.
Electrical Sundries.
Electric Cables.
Cement, Mortar, Plasters.
Bricks, Tiles and Salt Glazed Ware.

Forms of Tender, Specifications and Conditions from City Engineer and Planning Officer, Cabot Hse, Deanery Rd, Bristol 1. Tenders returnable by 21 Oct. Lowest or any tender not necessarily accepted. (S 250)

WHITCHURCH URBAN DISTRICT COUNCIL

STREET LIGHTING SCHEME—PHASE 1

TENDERS are invited for dismantling existing lighting points, supplying, delivering, erecting, wiring and fitting of:

45—25 ft concrete columns with 140 watt sodium discharge lamps;
59—15 ft concrete columns with 85 watt sodium discharge lamps

in the Urban District of Whitchurch in accordance with the Plan, Schedule and Specification prepared by the Council's Engineer and Surveyor, from whom Tender Documents are obtainable upon receipt of a cheque for two guineas being a deposit which will be returned upon receipt of a bona-fide Tender and the return of all Documents.

Tenders, in plain sealed envelopes endorsed "Street Lighting," to be delivered to the Clerk of the Council not later than 12 noon on Wednesday, 26 Oct., 1960.

The Council do not bind themselves to accept the lowest or any Tender.

FRANK CLAYTON,
Clerk of the Council.

Pauls Moss,
Dodington,
Whitchurch.
Shropshire.

(S 208)

APPOINTMENTS VACANT

THE NORTH EASTERN ELECTRICITY BOARD

CHIEF ENGINEER'S DEPARTMENT
COMMUNICATIONS SUB-SECTION

APPLICATIONS are invited for the appointment of a Senior Assistant Engineer to take charge of the Communications Sub-Section with location at Carliol Hse, Newcastle. Applicants should be fully qualified telecommunications engineers, with extensive experience in all branches of communications engineering, including telephony, selective control equipment and V.H.F. radio. The Board has a very extensive private telephone system and the successful candidate will be required to undertake the planning and development of this system. Corporate Membership of the I.E.E. would be an advantage.

Salary: Schedule B, Class AX, Grade 1, £1,825/£2,085. N.J.B. conditions.

Applications stating age, qualifications and experience, to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne 1, within ten days of the appearance of this advertisement. (S 242)

LONDON ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEERS

APPLICATIONS are invited for positions as General Assistant Engineers initially located at Uxbridge Rd, W.12 (ref.: PER/V/3109) or at Aldersgate St, E.C.1 (ref.: PER/V/3112).

Applicants should have a sound technical education to the standard of the Higher National Certificate, and have completed a recognised period of training in the Electrical Industry, or have equivalent experience.

Pending determination as to the grading and salary applicable to the post within the National Joint Board Agreement, the provisional minimum salary will be £685 per annum rising to £855 per annum, inclusive of London Allowance.

Application forms obtainable from the Personnel Officer, 46 New Broad St, E.C.2, to be returned completed within 14 days of the publication date of this notice. Please quote appropriate reference number. (S 232)

SOUTHERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER (PLANNING)
(Z.1257)

SUB-AREA Engineering Department of No. 1 (Southall) Sub-Area, located at Waterloo Rd, Uxbridge. Salary: N.J.B. Class M, Grade 10 (£1,325/£1,460 per annum, inclusive of London Allowance). N.J.B. Conditions of Service.

The duties of the post will be to assist in the planning of H.V. and L.V. networks, including system load flow and short circuit calculations.

ASSISTANT ENGINEER
(MAINTENANCE AND OPERATION)
(Z.1197)

Heston District of No. 1 (Southall) Sub-Area. Salary: N.J.B. Class G, Grade 9 (£1,015/£1,140 per annum, inclusive of London Allowance). N.J.B. Conditions of Service.

The duties of the post will be to assist with the maintenance and operation of switchgear, transformers, auxiliary gear and underground cables up to and including 11 kV. The appointment will involve standby duties. Rented housing accommodation may be made available.

Applications for these appointments on forms obtainable from the Sub-Area Secretary, 2/6 Windmill La, Southall Middlesex, and returned to him, quoting the appropriate "Z" number, not later than 17 Oct., 1960.

ASSISTANT ENGINEER
(MAINTENANCE AND OPERATION)

Melksham District of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class G, Grade 10 (£890/£1,015 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1113, not later than 17 Oct., 1960.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. (S 233)

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

Vacancy No. SW/AV/134/60.
THIRD ASSISTANT ENGINEERS

REQUIRED in the System Design Section of the Divisional Electrical Department at Bristol.

The work includes System Design, use of A.C. and D.C. calculators and co-ordination of protective gear settings. Applicants should possess qualifications leading to A.M.I.E.E., and have a keen interest in transmission theory and system design. Previous experience of this work an advantage, particularly for the higher graded post.

Superannuation Scheme. Salary for these posts will be within Class AX, Grade 6 and 7 of the N.J.B. Salaries agrement, i.e., Grade 6, Scale 12, £1,285/£1,500 p.a. Grade 7, Scale 11, £1,200/£1,410 per annum.

Applications on Form A.E.6/ACT obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 21 Oct., 1960, and should also indicate if it is restricted to the Grade 6 appointment only. (S 224)

GOVERNMENT OF HONG KONG

Electrical Engineer, Public Works Department

PLANNING, estimating, preparing specifications and supervision of complete electrical plant installations including M.V. and H.T. switchgear, transformers and 6·6 or 11 kV motors.

Pensionable appointment. Salary according to experience within the range £1,650/£2,865. Free passages. Rented quarters.

Candidates must be under 45 years and A.M.I.E.E., preferably with experience in either the installation of electrical plant connected with pumping stations or the installation of heating, ventilating and lift plant in large buildings.

Write Director of Recruitment, Colonial Office, London S.W.1, giving full names, age, qualifications and experience, quoting BCD.112/51/012/D.10. (S 252)

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

RESIDENT ENGINEER
TRANSMISSION DEPARTMENT
DIVISIONAL HEADQUARTERS

Vacancy No. 231/60.

A VACANCY exists for a Resident Engineer to supervise the Headquarters' works of the Central Electricity Generating Board in the East Midlands Division. The successful applicant will be located at Nottingham and will be responsible to the Chief Transmission Project Engineer at Headquarters for the supervision of contractors in the construction of 275 kV and 132 kV substations and the installation of high voltage cables.

Applicants should have a wide experience of 275 kV and 132 kV switchgear and transformers and be thoroughly conversant with modern control and protection arrangements and be capable of dealing with contractors' diagrams.

Applicants should possess an Electrical Engineering Degree or Higher National Certificate or other suitable qualifications.

The salary will be in accordance with Grade BX 5, Scale 14 (£1,535/£1,720 per annum) of the National Joint Board Agreement, and the position will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be addressed to O. S. Woods, Esq., Divisional Controller, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, to arrive not later than 18 Nov., 1960.

O. S. WOODS,
Divisional Controller.
(S 236)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 40s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

THE GOVERNMENT OF NORTHERN NIGERIA

REQUIRES **INSPECTORS OF WORKS (MECHANICAL)** on favourable contract terms.

Qualifications:

Candidates should be fully experienced in the operation, maintenance and overhaul of all kinds of road construction plant and commercial vehicles of all types. Experience should include machine shop practice as particularly applied to overhaul of petrol and compression ignition engines and automobile electrical apparatus. Preference will be given to candidates possessing a City and Guilds Certificate in vehicle technology.

Duties:

The maintenance and overhaul of road construction plant both in workshops and in running repairs on the job. Candidates should be prepared to live in temporary quarters on a construction site.

Emoluments:

1. SALARY. According to amount of experience in the range of £906/£1,554.

2. OUTFIT ALLOWANCE of £45 and Camp Equipment Allowance of £40 on first appointment.

3. RESETTLEMENT GRANT of £25 or £37 10s for each three months' service inclusive of earned leave payable on satisfactory completion of contract.

4. CHILDREN'S ALLOWANCE of £120 for one child, £216 for two and £288 for three children eligible.

5. FIRST-CLASS PASSAGES for officer and wife on appointment and on leave, and assistance towards cost of children's passages.

Leave:

Generous home leave on full pay.

Applicants should write to: The Recruitment Secretary (Overseas), Northern Region Recruiting Agency, Nigeria Hse, 9 Northumberland Ave, London W.C.2, or telephone TRAfalgar 1244. Extension 145. (S 156)

YORKSHIRE ELECTRICITY BOARD

No. 3 (Sheffield) Sub-Area

SHEFFIELD WEST DISTRICT
FIRST ASSISTANT DISTRICT ENGINEER

APPLICANTS should possess technical qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers and be experienced in the working of an electricity supply District.

Experience in the operation, maintenance and construction of substations and mains, both overhead and underground, and in the planning and estimating of development schemes on an electricity distribution system with voltages of up to 33 kV, will be an advantage.

Sheffield, despite its heavy industries, is on the edge of the Peak National Park with attractive residential areas.

Salary: N.J.B. Class J, Grade 4 (Scale 14), £1,535/£1,720 per annum.

Applications, together with the names of two referees, should be returned to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield, not later than 21 Oct., 1960.

No. 5 (Wakefield) Sub-Area

BARNSLEY DISTRICT
SERVICE CENTRE SUPERVISOR

Applicants must be thoroughly experienced in Service Centre work including the sale of electrical appliances, hire purchase procedure, handling of consumers' inquiries, display, and must be capable of advising consumers on any matters relating to electricity in the home. The successful applicant will be responsible for the internal organisation of the Service Centre and the control of staff. Suitable qualifications will be an advantage.

The post will be based on the Eldon St Service Centre, Barnsley.

Salary: N.J.C. Grade 4, £890 x £30—£1,010 per annum.

DONCASTER DISTRICT
ASSISTANT CONSUMERS' ENGINEER

This post offers an opening for a young man with the technical standard of the

continued in next column

continued from previous column

Ordinary National Certificate in Electrical Engineering who has preferably already had some training in installation work. He will be given training in the various aspects of commercial work in the District, dealing with new and increased supplies to small industrial and commercial consumers, street lighting negotiations and tariff queries. He will, initially, be required to supervise the Installation Inspectors and to render general assistance to the Consumers' Engineer.

Salary: N.J.B. Class H, Grade 13 (Scale 4), £765/£870 per annum.

Applications, together with the names of two referees, should be returned to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 21 Oct., 1960.

No. 7 (Grimsby) Sub-Area

SENIOR ASSISTANT
(ACCOUNTANCY, COSTING AND STORES)

Candidates should have had sound costing experience and be capable of initiating and carrying out instructions without immediate supervision, and will be required to assist the Senior Assistant responsible for the Section with much of the detail supervisory work. The possession of an Accountancy qualification will be an advantage.

Salary: N.J.C. Grade 4, £890 x £30—£1,010 per annum.

Applications, together with the names of two referees, should be returned to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Rd, Grimsby, not later than 21 Oct., 1960. (S 238)

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

STATION CHEMIST
COVENTRY POWER STATION

Vacancy No. 225/60.

APPLICATIONS are invited for the position of Station Chemist at Coventry Power Station, Alderman's Grn, Coventry.

Previous experience in a power station laboratory an advantage and candidates should preferably be Associates of the Royal Institue of Chemistry or hold equivalent qualifications. The successful candidate will be required to take charge of the laboratory, the functions of which include the analysis of coal, oil, water and other substances and the control of water softening plant.

Salary will be in accordance with Class G, Grade 7 (£1,115/£1,245 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 15 Oct., 1960.

SHIFT CHARGE ENGINEER
DRAKELOW "A" POWER STATION

Vacancy No. 229/60.

Applications are invited for the position of Shift Charge Engineer at Drakelow "A" Power Station, near Burton on Trent, Staffs.

Candidates should be suitably qualified and have had experience with large capacity high pressure turbo-alternators and pulverised fuel fired boilers.

Applicants should be in possession of technical qualifications admitting to Corporate Membership of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers.

Salary will be in accordance with Class J, Grade 6 (£1,350/£1,500 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 15 Oct., 1960.

ASSISTANT SHIFT CHARGE ENGINEERS
WILLINGTON "B" POWER STATION

Vacancy No. 230/60.

Applications are invited for the positions of Assistant Shift Charge Engineers at Willington "B" Power Station, P.O. Box No. 27, Derby.

Applicants should have received a sound technical training and have had experience in a modern power station. Preference will be given to candidates who possess the Higher National Certificate or its equivalent.

Salary will be in accordance with Class K,

continued in next column

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Grade 8 (£1,275/£1,410 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Applicants for Vacancy No. 153/60 need not re-apply.

Closing date for receipt of applications: 22 Oct., 1960.

These appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Station Superintendent, and should be returned to him by the date stated.

O. S. WOODS,
Divisional Controller.
(S 237)

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT COMMERCIAL ENGINEER

WEALD district. Salary under N.J.B. Class E, Grade 3 (Scale 11), £1,275/£1,410 per annum with progression to Grade 2 (maximum salary £1,500) subject to satisfactory service. Superannuable. Successful applicant will be required to organise and control all commercial activities in a predominantly rural district. Applicants should have had considerable experience in commercial, domestic and rural development of electricity supply including control of contracting section, showrooms and retail sales and all aspects of service to consumers. Corporate membership of the Institution of Electrical Engineers or equivalent qualification in electrical engineering will be an advantage.

Applications to District Manager, Seeboard, Highgate, Hawkhurst, Kent, by 10 Oct., 1960.

GEORGE WRAY.
(S 239)

NEWCASTLE UPON TYNE EDUCATION COMMITTEE

Rutherford College of Technology

(SELECTED FOR DEVELOPMENT INTO A COLLEGE OF ADVANCED TECHNOLOGY)

THE Governors invite applications for the following posts of PRINCIPAL LECTURER occurring as a result of the expansion of the college, duties in each case to commence on 1 Jan., 1961, or as soon as possible. As the college is concerned almost exclusively with advanced work leading to external degrees, professional membership, H.N.C., H.N.D., Dip. Tech. and Post-Graduate courses, candidates will be expected to have good academic qualifications and several years of advanced (full-time) teaching experience.

(a) Department of Chemistry and Metallurgy (two posts): One post will be partly administrative in character to assist the Head in routine administration; for the other, the ability to initiate, supervise and undertake research is essential.

(b) Department of Electrical Engineering: Candidates should have a good industrial background with, preferably, a knowledge of power engineering and some research experience.

(c) Department of Mathematics: Industrial and/or research experience will be expected.

(d) Department of Mechanical Engineering: A good industrial background is essential, while some research experience would be advantageous.

Salary will be in accordance with the Burnham (1959) Award, viz.: £1,750 x £50—£1,900.

Further particulars and form of application (returnable within 14 days) may be obtained from the Principal, Rutherford College of Technology, Northumberland Rd, Newcastle upon Tyne 1. (S 240)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

CUMBERNAULD DEVELOPMENT CORPORATION

A VACANCY exists within the Department of the Chief Architect and Planning Officer for the undernoted post:

ASSISTANT ELECTRICAL ENGINEER

H.N.C. or Grad. I.E.E. required. Salary scale APT.III (£880/£1,065). The salary scale is at present under review. Commencing salary within the above grade will be fixed according to qualifications and experience.

Five-day week. Local Government Superannuation, subject to medical examination. Canteen facilities. Assistance will be given with housing where appropriate.

Application forms, which can be obtained from the General Manager, Cumbernauld Development Corporation, Cumbernauld Hse, Cumbernauld, Glasgow, should be returned not later than Monday, 17 Oct., 1960. (S 225)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS invited for the following superannuable N.J.B. appointments in the South Wales Division:

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)
CARMARTHEN BAY POWER STATION
Vacancy No. 256/ET/60.

Salary: Schedule A, Class K, Grade 8, Scale 11, £1,275/£1,410 per annum.

Applicants should have experience in the maintenance of heavy plant and will be required to carry out practical and works office duties.

H.N.C. or equivalent qualifications.

STATION SHIFT CONTROL ENGINEER
UPPER BOAT POWER STATION
PONTYPRIDD, GLAM
Vacancy No. 257/ET/60.

Salary: Schedule A, Class H, Grade 10, Scale 7, £965/£1,090 per annum, plus 10% shift enhancement.

Applicants should have operating experience in a modern power station and possess H.N.C. or equivalent qualifications.

ASSISTANT ENGINEER (COMBUSTION AND EFFICIENCY)
ROGERSTONE POWER STATION, MON
Vacancy No. 258/ET/60.

Salary: Schedule A, Class G, Grade 6, Scale 10, £1,190/£1,325 per annum.

Duties include supervision of combustion and efficiency of two 60 MW units, 900 lb per sq in., 900°F, together with maintenance of associated instrumentation and automatic control equipment. Experience of large PF boilers desirable.

ASSISTANT ENGINEER (TRAINING)
CARMARTHEN BAY POWER STATION
Vacancy No. 259/ET/60.

Salary: Schedule A, Class K, Grade 7, Scale 12, £1,350/£1,500 per annum.

ASSISTANT ENGINEER (TRAINING)
USKMOUTH "A" POWER STATION
NR. NEWPORT, MON
Vacancy No. 260/ET/60.

Salary: Schedule A, Class K, Grade 7, Scale 12, £1,350/£1,500 per annum.

Applicants should possess H.N.C. (Mechanical) or (Electrical) or equivalent qualifications and have had operating experience in a modern power station.

Lecturing experience would be an advantage.

ASSISTANT ENGINEER (COMBUSTION AND EFFICIENCY)
NEWPORT POWER STATION
Vacancy No. 261/ET/60.

Salary: Schedule A, Class F, Grade 7, Scale 8, £1,040/£1,165 per annum.

Applicants should possess H.N.C. or equivalent qualifications.

Power Station experience and knowledge of automatic combustion control equipment desirable.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 21 Oct., 1960. (S 248)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area

SUB-AREA HEADQUARTERS, BEDFORD
GENERAL ASSISTANT ENGINEER (ENGINEERING DRAUGHTSMAN)
263/60.R.

Candidates should have had a good general and technical education and should preferably be experienced in substation design, layout of equipment and the preparation of plans and detailed drawings of buildings and civil engineering works.

Salary: N.J.B. Class L, Grade 16 (£765/£870).

Apply by letter to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend St, Bedford, by 21 Oct., 1960.

Northmet Sub-Area

SUB-AREA HEADQUARTERS, SOUTHGATE N.14
FOURTH ASSISTANT ENGINEER
PLANNING SECTION (REF. 1006)
264/60.R.

Candidates should have had a good technical education and possess the Higher National Certificate or equivalent qualification. They should have a knowledge of substation plant and protective gear, be experienced in the design and layout of substations and be capable of supervising site works.

Salary: N.J.B. Grade 13 (£1,115/£1,245), plus London Allowance.

Apply by letter to the Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet Hse, Southgate, N.14, by 17 Oct., 1960.

Suffolk Sub-Area

IPSWICH DISTRICT
FOURTH ASSISTANT ENGINEER
265/60.R.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems including substations. Possession of the Higher National Certificate in Electrical Engineering or its equivalent will be an advantage.

Salary: N.J.B. Class G, Grade 11 (£825/£940).

Apply by letter to R. A. Jackson, A.M.I.E.E., A.M.B.I.M., Manager, Ipswich District, Eastern Electricity Board, Electric Hse, Ipswich, Suffolk, by 21 Oct., 1960. (S 249)

THE SOUTH WALES ELECTRICITY BOARD

MANAGER—WEST WALES AREA

APPLICATIONS are invited for the post of Manager of this Area, based at Tenby, which covers the whole of Pembrokeshire, Southern Cardiganshire, and the greater part of Carmarthenshire, and comprises a very large rural area in which much development remains to be done. Some industrial development can also be anticipated, particularly in the Milford Haven area of Pembrokeshire.

Managerial experience in the Electricity Supply Industry is essential and applicants should possess a recognised professional qualification.

The scale of salary applicable to the post (in accordance with the scale of the National Joint Managerial and Higher Executive Grades Committee) will be £2,815/£3,040. The successful candidate will be required to commence duty on 1 March, 1961.

Applications should be sent to the undersigned at the Head Office of the Board at St. Mellons, Cardiff, marked "Manager—West Wales Area," by Monday, 31 Oct., 1960.

R. G. WILLIAMS,
Secretary.
(S 223)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

LITTLEBROOK POWER STATION
ASSISTANT ENGINEER (EFFICIENCY)
Vacancy No. 73A/60T.

CANDIDATES should possess technical qualifications to at least H.N.C. standard and practical experience in generating station work would be an advantage. The successful applicant will be required to assist the Station Efficiency Engineer in investigation into the thermal performance of the plant, and will be required to work independently and to take the initiative in solving problems which arise.

Salary: Class L, Grade 11, £1,165/£1,295 per annum, including London Allowance.

Applications giving age, qualifications, experience, etc., and quoting vacancy number, should be sent to the Station Superintendent, Littlebrook Power Station, near Dartford, Kent, to arrive by 14 Oct., 1960.

W. H. DUNKLEY,
Divisional Controller.
(S 246)

LONDON ELECTRICITY BOARD

ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the above position at Bengeworth Rd, S.E.5.

Candidates should have a good general and technical education and be in possession of the Ordinary National Certificate, be neat and capable draughtsmen and be experienced in one or more of the following subjects: drawing office routine, electrical diagrams, lay-out of plant in transformer chambers, mains survey and recording of mains work. A knowledge of building construction would be an advantage.

Pending determination as to the grading of the posts within Schedule "A" of the National Joint Board Agreement, the salary will be in the provisional range £775 per annum rising to £855 per annum inclusive of London Allowance.

Application form obtainable from the Personnel Officer, 46 New Broad St, E.C.2, to be returned completed within 14 days of the publication date of this notice. Please quote ref.: PER/V/3111/T. (S 231)

THE EAST MIDLANDS ELECTRICITY BOARD

Northamptonshire Sub-Area

PRINCIPAL ASSISTANT
(BUILDING AND ESTATES SECTION)
Vacancy No. 109/60.

Salary: N.J.C. Grade 7, £1,250 x £35 to £1,355 per annum.

THE successful applicant should have experience in all aspects of the building trade and the ability to handle projects from initial stages to bills of quantity and supervision of works in progress.

Applications giving details of age, present position and salary, qualifications and experience should be addressed to The Manager, Northamptonshire Sub-Area, 25 Bridge St, Northampton, within 14 days of the date of this advertisement.

Derby and Burton Sub-Area

DEMONSTRATOR
DERBY DISTRICT
Vacancy No. 111/60.

Salary: N.J.C. Grade 1, £600 x £25—£700 per annum.

Applicants should hold the E.A.W. Electrical Housecraft Certificate and have experience in conducting demonstrations in Service Centres and general Service Centre duties. Candidates should also be experienced in advising consumers on the selection and use of electrical appliances both at the Service Centre and on consumers' premises.

Applications giving details of age, present position and salary, qualifications and experience should be addressed to The Manager, Derby and Burton Sub-Area, Electricity Offices, Irongate, Derby, in a confidential envelope endorsed "Demonstrator," within 14 days of the date of this advertisement. (S 234)

MIDDLESEX COUNTY COUNCIL

County Architect's Dept.

ELECTRICAL ENGINEERING ASSISTANT APT. I.

£645/£815, PLUS LONDON WEIGHTING UP TO £40 p.a.

TO assist in preparation of drawings, etc., for electrical installation of schools, etc. Commencing salary according to quals. and exper. Established. Prescribed conditions. Application forms from County Architect, 1 Queen Anne's Gate Bldgs, Dartmouth St, S.W.1. S.f'scap.e. returnable by 22 Oct. (Quote E.517ET.) (S 241)

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the superannuable position of DEPUTY SUPERINTENDENT at Yoker Generating Station.

Applicants should possess qualifications of not less than Higher National Certificate standard, and, preferably, be Corporate Members of one of the Senior Engineering Institutions. They should also have some knowledge of modern management techniques and have had considerable experience in the operation and maintenance of generating stations.

Salary: N.J.B. Class F, Grade 3, £1,350/£1,500 per annum.

Applications, on the standard form, and quoting reference G31/60, should be submitted to the Secretary, South of Scotland Electricity Board, Inverlair Ave, Glasgow S.4, not later than 21 Oct., 1960. (S 235)

CAMERON HIGHLANDS

HYDRO-ELECTRIC SCHEME

MALAYA

INSPECTOR OF WORKS

REQUIRED by Consulting Engineers for site construction Staff Inspector of Works, with experience of overseeing foundations for light structures in difficult ground, and some experience of overhead 132 kV transmission line construction.

The work would be entirely in the field, along the transmission line route.

The appointment would be for two years commencing early 1961. Passages provided, free medical attention, transport allowance and concessionary housing. Salary not less than £1,900 per annum

Applications should be made in writing within 14 days of the publication of this advertisement, giving full details of previous experience, age, etc., to Preece, Cardew and Rider, Consulting Engineers, 8, 10 and 12 Queen Anne's Gate, London S.W.1. (S 222)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

CROYDON "B" POWER STATION
ASSISTANT ENGINEER (CONTROL)
Vacancy No. 122A/60.

CANDIDATES should have experience in the operation of modern generating plant and/or Control Room work, and should have had technical training to O.N.C. level.

N.J.B. conditions of Service and salary Class J, Grade 13, £965/£1,084 per annum including London Allowance and shift allowance.

Applications giving age, details of training, experience, etc., and quoting vacancy number, should be sent to the Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey, to arrive by 10 Oct., 1960. (S 220)

THE SOUTH WALES ELECTRICITY BOARD

COMMERCIAL ASSISTANT
ASSISTANT ENGINEERS

APPLICATIONS are invited for the following positions in the Cardiff and East Central Area of the Board.

(a) Commercial Assistant, Rhondda District.

Applicants should possess a Higher National Certificate in Electrical Engineering or hold equivalent qualifications, have a thorough knowledge of domestic appliances and be competent to advise consumers in the utilisation of electricity.

The successful applicant will be responsible to the District Commercial Engineer for all sales activities within the District.

Salary: N.J.B. Class F, Grade 9, Scale 6 (£890/£1,015 per annum).

(b) General Assistant Engineer, Rhondda District. The duties of this post will be of a general nature and preference will be given to Engineers possessing a Higher National Certificate in Electrical Engineering.

Salary: N.J.B. Class F, Grade 11, Scale 4 (£765/£870 per annum).

(c) General Assistant Engineer, Barry District. The duties of this post will be of a general nature and preference will be given to Engineers possessing a Higher National Certificate in Electrical Engineering.

Salary: N.J.B. Class F, Grade 9, Scale 6 (£890/£1,015 per annum).

Applications stating age, present position, present salary, qualifications and experience should be addressed to C. L. Townsend, ASSOC.I.E.E., Manager, Cardiff and East Central Area, 445/447 Cowbridge Rd East, Cardiff, to arrive not later than 22 Oct., 1960.

Please quote reference (a) 183/60/ET, (b) 184/60/ET and (c) 185/60/ET, endorsing envelope with appropriate designation of post.

R. G. WILLIAMS,
Secretary.
(S221)

DEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGS CEYLON

POST OF SENIOR MECHANICAL ENGINEER

HYDRO-ELECTRIC SCHEME—STAGE IIB

APPLICATIONS are invited for the post of Senior Mechanical Engineer for the supervision of contracts in connection with the Thermal Back-up Plant of the above scheme. The contracts provide for a 250,000 lb per hour boiler and a 25 MW turbo-alternator set working on a steam cycle of 900 p.s.i.g. and 900°F. The appointment will be for a period of 27 months from about November, 1960.

2. The salary of the post is £3,000/£3,400 per annum according to experience of the candidate selected which will be paid at the current rate of exchange.

3. The successful applicant will be required to furnish a medical certificate as to his physical fitness for service in Ceylon.

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4. The Ceylon Government will contribute 7½% of salary to a Provident Fund. Free passages to the Island and back will be provided for the successful applicant and his family up to a maximum of four persons besides the applicant. Rent allowance, if not in occupation of Government quarters and Cost of Living allowances are payable in terms of Government Regulations in force at the time.

5. Applicants must be Corporate Members of the Institution of Mechanical Engineers and have had previous experience in the erection of steam raising and generating plant. The successful applicant will be required to spend some time in Germany and England at the works of the Contractors before proceeding to Ceylon.

6. A specimen copy of the letter of appointment could be inspected at the office of the Ceylon Government Representative.

7. Applications giving full details of experience should be submitted in triplicate with three copies of testimonials to Messrs. Preece, Cardew & Rider, 8, 10, and 12 Queen Anne's Gate, Westminster, London S.W.1, not later than Friday, 21 Oct., 1960. (S 210)

MIDLANDS ELECTRICITY BOARD

GENERAL ASSISTANT DISTRICT ENGINEER

REQUIRED in the Dudley District of the South Staffs. & North Worcs. Sub-Area. Applicants should have suitable technical qualifications and training in engineering duties associated with electricity distribution systems.

Salary: £670/£750 per annum (N.J.B. Grade G.14). Superannuable.

Apply, by letter, within 14 days, stating age, experience, present position and salary to Mr H. A. P. Caddell, Sub-Area Manager, (Ref. SEC), Midlands Electricity Board, P.O. Box No. 9, Toll End Rd, Tipton, Staffs. (S 212)

THE NORTH WESTERN ELECTRICITY BOARD

FOURTH ASSISTANT DISTRICT ENGINEER
BURY DISTRICT

THE duties will include assisting the District Engineer in the construction, operation and maintenance of the 33 kV, 11 kV and low voltage distribution systems.

The possession of the H.N.C. and Graduate Membership of the Institution of Electrical Engineers would be an advantage.

Salary Scale: £890/£1,015 p.a., Grade H.11. N.J.B Conditions.

Application forms can be obtained from the Manager, No. 2 Sub-Area, The North Western Electricity Board, 2 St. George's Rd, Bolton, and returned to him by 17 Oct., 1960.

SECOND ASSISTANT DISTRICT
COMMERCIAL ENGINEER
(CONTRACTING AND REPAIRS)
STOCKPORT DISTRICT

Applicants should be capable of estimating for, and supervising electrical installation contracts and domestic appliance repairs in workshops and on consumers' premises. Technical qualifications are desirable.

Salary Scale: £1,115/£1,245 p.a., Grade G.7. N.J.B. Conditions.

Application forms to be obtained from the Manager, No. 3 Sub-Area, The North Western Electricity Board, Union St, Oldham, and returned to him by 17 Oct., 1960.

GENERAL ASSISTANT ENGINEER
SUB-AREA ENGINEERING DEPARTMENT
BLACKBURN

Preference will be given to applicants who possess the H.N.C. in Electrical Engineering.

Salary Scale: £625/£805 p.a., Grade L.19/17. N.J.B. Conditions.

Applications on forms to be obtained from the Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee St, Blackburn, and returned to him by 15 Oct., 1960. (S 215)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Edinburgh and Borders Area

THIRD ASSISTANT ENGINEER
(PLANNING AND DEVELOPMENT)
AREA HEADQUARTERS
DEWAR PLACE, EDINBURGH
SALARY: N.J.B. SCHEDULE A, CLASS L
GRADE 10, £1,190/£1,325 P.A.

APPLICANTS for this appointment should have a sound engineering training and subsequent experience in the design and layout of densely loaded distribution networks in the City areas and also rural systems at pressures up to and including 33 kV. A knowledge of the application of modern protective equipment and of the calculation and preparation of load flow diagrams and fault levels will be necessary. Applicants must also possess as a minimum qualification a Higher National Certificate in Electrical Engineering or its equivalent.

Conditions of service will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry. The successful candidate, subject to satisfactory evidence of health, will require to become a contributor to the Board's Superannuation Scheme.

The successful candidate will require to reside within a reasonable distance of Area Headquarters.

Applications, on the standard form, obtainable from the undersigned or any other Area Manager, should be submitted not later than 22 Oct., 1960.

C. H. A. COLLYNS,
Manager.

52 Melville St,
Edinburgh 3.
26 Sept., 1960. (S 209)

CENTRAL ELECTRICITY GENERATING BOARD
London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A and B. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E or I.Mech.E. an advantage.

SECOND ASSISTANT ENGINEER—GROUP III
GENERATION DEPARTMENT
DIVISIONAL HEADQUARTERS
GENERATION HOUSE
Vacancy No. 60/822.

Candidates should be familiar with the operational requirements of modern power stations, knowledge of salary and wage agreements for Electricity Supply Industry an additional advantage. The appointment offers opportunity for gaining experience in executive and administrative functions and duties will include analysis of returns and programmes, investigation of engineering problems and to generally assist the Group Generation Engineer. Salary: Class BX, Grade 5, £1,425/£1,780 from 1 July, 1960. £1,465/£1,780 from 1 July, 1961.

SENIOR DRAUGHTSMAN (ELECTRICAL)
CONSTRUCTION SECTION
GENERATION DEPARTMENT
DIVISIONAL HEADQUARTERS
GENERATION HOUSE
Vacancy No. 60/823.

Candidates should have had a good technical education and possess the ordinary National Certificate or equivalent. Experience in layout of indoor and outdoor 132 kV substations is essential for work on Transmission schemes. Some experience of the preparation of multicore cable schedules and layout, together with schematic and wiring diagrams would be an advantage. Salary: Scale 6, £770/£1,065 per annum.

ASSISTANT ENGINEER
(ELECTRICAL TEST)
FULHAM POWER STATION
Vacancy No. 60/826.

Sound technical training with knowledge of testing and routine maintenance of power station electrical equipment including generators, switchgear, transformers, motors and protective equipment. Salary: Class K, Grade 15, £805/£920 per annum.

Applications, quoting vacancy no. to (or on form from) Personnel Officer, Central Electricity Generating Board, London Division, P.O. Box 136, London W.1, by 17 Oct., 1960. (S 214)

CENTRAL ELECTRICITY BOARD
Mauritius

DISTRICT ENGINEERS

APPLICATIONS are invited for the posts of District Engineer in the Board's Transmission and Distribution Department.

Candidates, who must possess a B.Sc.(Eng) or A.M.I.E.E. qualification, must have had wide experience in the distribution of electricity including service with a Public Electricity Supply Undertaking. They must be capable of taking charge of a District and of assuming responsibility for all the distribution activities of that district, including new construction, repair and maintenance, strengthening of the distribution system, maintenance and operation of substations and fault location.

Salary will be according to experience and qualification in scale rising to equivalent to £1,665 a year. A car allowance is provided, and if necessary a loan to purchase a car would be granted.

For Mauritius candidates now resident outside the Colony, the posts offer the possibility of permanent and pensionable employment.

Overseas candidates would be on contract for three years in the first instance and housing allowance equivalent to £180 a year would be payable together with free passages for officer, wife and up to two children. Liberal leave on full salary. Gratuity of £200 a year whilst serving on temporary terms.

Write to the CROWN AGENTS, 4 Millbank, London S.W.1. State age, name in block letters, qualifications and experience and quote M2A/51155/EE. (S 211)

WESTERN NIGERIA DEVELOPMENT CORPORATION
IBADAN, NIGERIA

VACANCY FOR THE POST OF
ELECTRICAL ENGINEER

THE Western Nigeria Development Corporation, Ibadan, Nigeria, invites applications from suitably qualified candidates to fill the vacant post of Electrical Engineer in its establishment.

Salary Scale:

£1,265 x £63—£1,517. Plus inducement allowance of £270 per annum. The point of entry will depend on qualifications and experience.

Qualifications:

Candidates should be Graduates of the Institution of Electrical Engineers or possess the Higher National Certificate in Electrical Engineering and preferably should have had a recognised apprenticeship including sound practical experience in factory installations. He must possess the ability to train Artisans in his field of work.

Duties:

The Officer appointed will be responsible to the Constructional Engineer for installation of electrical plant in a medium size factory in Nigeria and later under the Mill Manager, for maintenance of Electrical equipment including 415 V alternators rated up to 400 KW, M.T. switchgear and distribution, motors, lighting, etc.

Conditions of Service:

The terms of service include partly furnished accommodation at the rate of 8⅓% of the basic salary; free medical service. (In the case of an overseas officer being appointed, an outfit allowance for candidates coming to the tropics for the first time is payable, and a free passage for wife and free passages once each way per tour for children up to three in number not over the age of 13 are provided.) Employee is re-

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quired to contribute 10% of salary to a Provident Fund; the Corporation contributes an equal amount. Leave at full pay is granted at the rate of five days for every completed month of service. Normal length of tour is 18/24 months.

Methods of Application:

Applications should be completed in triplicate on the prescribed form obtainable from the Official Secretary (Recruitment Branch), Office of the Commissioner for Western Nigeria, 178/202 Great Portland St, London W.1, from whom further particulars may also be obtained.

Closing date: November 7th, 1960

(S 213)

A.C. MACHINE DESIGN ENGINEER REQUIRED (N.E. ENGLAND). Experience of design, manufacture and testing of large solid rotor alternators and/or salient pole machines essential. Knowledge of design of exciters and motors a further asset.

Applicant preferably should have an engineering degree, but minimum qualifications Grad. I.E.E. or equivalent.

Applications stating age, qualifications, experience and salary required by 17 Oct., 1960, latest, to Box No. 8027, Electrical Times. (S 258)

BRITISH Engine Boiler and Electrical Insurance Co. Ltd., 98 West George St, Glasgow C.2. ELECTRICAL SURVEYOR required in Scotland. Permanent position carrying progressive salary scale £800/£1,100 and non-contributory pension. Candidates aged 26 to 32, with H.N.C. in Electrical Engineering or Grad. I.E.E. and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply stating age, qualifications and experience. (S 243)

CONSULTING ENGINEERS require ASSISTANT ELECTRICAL ENGINEERS, graduates with three/four years' suitable experience on EHV transmission for (a) Contract Engineer, Weybridge, Surrey; (b) site supervision, North West England. Ref.: MVR. Kennedy and Donkin, 12 Caxton St, Westminster, S.W.1. (S 255)

CABLE JOINTERS required for work up to 11 kV in Cardiff area. Send brief details, age, experience, etc., to Box No. 8011, Electrical Times. (S 145)

PIRELLI-GENERAL CABLE WORKS LTD.

require a

TECHNICAL ENGINEER

for the design and lay-out of Transmission Line Projects. Experience should include preparation of Profiles Plotting Supports, Pole Schedules and Quantity Schedules for Contracts.

Apply in writing stating age, experience and salary required to:

THE MANAGER (PERSONAL),
OVERHEAD LINES
DEPARTMENT,
LEIGH ROAD, EASTLEIGH,
HANTS.

(S 226)

THE OVERSEAS ENGINEERING DEPARTMENT

of the

DUNLOP RUBBER COMPANY LIMITED

has a vacancy for an

ELECTRICAL DRAUGHTSMAN

to carry out design and detail work in connection with electrical installations in Overseas Factories of the Dunlop Group.

This is an ideal opportunity for a young engineer having experience of A.C. and D.C. motor control schemes, H.T. and L.T. distribution layouts and lighting installations. Minimum qualification required is O.N.C.—Electrical.

The appointment is pensionable to those under 44 years at the time of engagement, and the person appointed will be employed at Fort Dunlop, Birmingham. Please write, giving age, experience and commencing salary expected, to:

Staff Officer, Employment Department,
Fort Dunlop, Erdington, Birmingham, 24.

(S 217)

CROMPTON PARKINSON LTD. require TWO SALES ENGINEERS for special duties in their Overseas Division, London. These duties will include liaison between home and overseas factories and the Company's world-wide marketing organisation and general assistance in the sales promotion of the Company's Switchgear, Transformers and Rotating Plant Products. One appointment will be for Switchgear and Transformers and the second for Rotating Machines. Really go-ahead young men will find excellent opportunities through these appointments. Applications, including details of education, experience and salary required should be sent to Ref. XS, Crompton Hse, Aldwych, London W.C.2. (S 196)

DESIGN ENGINEER required for Consulting Engineer's Office to undertake the design of electrical services for all classes of buildings, including hospitals, industrial and commercial buildings, at home and abroad. Spring and summer holidays. Pension scheme and luncheon vouchers. Apply in writing, stating age, experience, present salary and salary required to: J. Roger Preston and Partners, 15 North Audley St, London W.1. (S 247)

ELECTRICAL SUPERVISING or ESTIMATING ENGINEER used to industrial contracts, required for Cardiff Branch of Drake and Gorham (Contractors) Ltd. Write giving details of experience, etc., to 13 St. Andrew's Cres, Cardiff. (S 116)

ELECTRICAL ENGINEERS

Vacancies exist for Electrical Engineers of all grades to work on all aspects of co-ordination and engineering of electrical power systems for nuclear power stations. The appointments exist at the Whetstone Works of the English Electric Company which is situated in rural surroundings. Assistance will be given with initial accommodation.

The work includes the following:

1. Engineering design and co-ordination of the cable installation.
2. Engineering contract design and co-ordination of switchgear, contactor gear, and other main electrical plant items.
3. Engineering design of lighting and small power systems.
4. Design and development of electrical auxiliary power systems for nuclear power stations.

The positions offer good prospects for advancement in the power engineering field. The minimum qualification required is H.N.C. (Electrical).

It is advantageous if enquiries for these, or any other appointments within the Group, give full details of experience, qualifications, age and current salary, which can be addressed to:

THE TECHNICAL STAFF OFFICER,
DEPARTMENT G.P.S.,
ENGLISH ELECTRIC HOUSE,
STRAND, LONDON, W.C.2,

quoting reference ET 1818D. (S 218)

ALBRIGHT AND WILSON (MFG) LTD.

require

AN ELECTRICAL DRAUGHTSMAN

in their Central Engineering Department. Applicants should have had experience in preparation of drawings, material schedules, etc., for power and lighting installations, including substation and switchroom equipment, high voltage and low voltage. Applications are invited from men who have H.N.C. in Electrical Engineering and are between the ages of 23-30. Please apply to:

Staff Officer (Ref. 661),
Central Personnel Department,
Albright and Wilson (Mfg) Ltd,
P.O. Box 3,
Oldbury, Birmingham.

(S 230)

ELECTRICAL ENGINEER required for Glasgow office staff, age 23-28. Applicants (H.N.C. minimum) should have had experience in the manufacture of electrical machines. Progressive salary with non-contributory pension. Applications stating age, nationality, qualifications and experience to British Engine Boiler and Electrical Insurance Co. Ltd., 98 West George St, Glasgow C.2. (S 244)

ELECTRICAL DRAUGHTSMAN required for Consulting Engineer's Office to assist in the preparation and design of electrical services for all classes of buildings, including hospitals, industrial and commercial buildings, at home and abroad. Spring and summer holidays. Pension scheme and luncheon vouchers. Apply in writing, stating age, experience, present salary and salary required to: J. Roger Preston and Partners, 15 North Audley St, London W.1. (S 245)

ELECTRICAL DRAUGHTSMAN to take charge of small drawing office in works situated North London manufacturing distribution switchboards and general installation equipment. As the appointment would involve some work on the board it would probably suit a younger man with several years' recent experience as Designer Draughtsman, and who is looking for some added responsibility and an outlet for originality and initiative. Commencing salary not less than £900 p.a. with senior staff and pension benefits.—Box No. 8029, Electrical Times. (S 259)

BICC

ENGINEERS

required for the erection of steel tower and wood pole Overhead Transmission Lines at home and overseas. Applicants should have a general engineering background up to O.N.C. level. Experience desirable but not essential. Permanent position including Pension Fund membership after satisfactory probation.

Applications giving full details of experience, age and qualification to the

STAFF OFFICER.
BIC Construction Co. Ltd.,
30 Leicester Square,
London W.C.2.

(S 228)

Excellent opportunity for an EXPERIENCED ENGINEER

capable of taking charge of underground cable and overhead line contracts with a well-known progressive firm, used to working independently and controlling labour. Good salary and prospects. Superannuation scheme. Write in confidence giving age and full particulars of past experience to Box No. 8017, Electrical Times. (S 200)

JUNIOR SALES OFFICE CLERK required by well-known company manufacturing electrical domestic appliances. Excellent opportunity for right applicant to progress to outside representative. Write giving full particulars to Box No. 8033, Electrical Times. (S 261)

QUALIFIED ELECTRICAL DESIGN ENGINEER required to work in Jamaica on power and lighting schemes for building projects. Work includes design and supervision. Some knowledge of other building services and air conditioning an advantage. Apply in writing giving full details of age, experience and U.K. salary required (successful candidate will work in London office initially) to: Norman and Dawbarn, Architects and Consulting Engineers, 7 Portland Pl, London W.1. (S 253)

SENIOR SALES OFFICE CLERK required to take charge of Sales Office in well-known company manufacturing electrical domestic appliances. Write giving full particulars to Box No. 8031, Electrical Times. (S 260)

SHIFT ELECTRICAL FOREMEN are required by Bowaters United Kingdom Pulp and Paper Mills Limited, Thames Division, Northfleet, Kent.

Applicants should have served a recognised apprenticeship and hold the Ordinary National Certificate in Electrical Engineering. Experience should include power engineering as encountered in a factory installation, H.T. and M.V. distribution, A.C. and D.C. motors with their associated control systems and some knowledge of electronics.

A contributory superannuation fund is operated by the Company.

Applications should be sent to the Chief Engineer at the above address giving full details of age, training and experience. (S 227)

SMALL West End builder seeks ELECTRICIAN wishing to start own business to take over jobbing electrical work, or might suit someone seeking part-time business.—Box No. 8019, Electrical Times. (S 201)

SENIOR ELECTRICAL DESIGN ENGINEER required to lead team of approximately six assistant engineers and draughtsmen. Candidates to be thoroughly experienced in all aspects of electrical services work to buildings and to be suitably qualified. Salary offered will be not less than £1,500 per annum. Apply in writing giving full details of age, experience and salary required to Norman and Dawbarn, Architects and Consulting Engineers, 7 Portland Pl, London W.1. (S 254)

VACANCIES exist for Technical Sales Engineers and Testers with experience in control circuits, timers and relays. Five-day week. Housing available. Apply: Electrical Remote Control Co. Ltd., Bush Fair, Harlow, Essex. (S 256)

W. H. ALLEN SONS & COMPANY LTD.
BEDFORD

require

AN ASSISTANT ELECTRICAL DESIGNER

(Ref 506/7)

Applications are invited for the post of an Assistant Electrical Designer to work on small to medium size A.C. machines.

The successful candidate will be between 21-30 years old and have either

(a) An H.N.C. in Electrical Engineering and previous experience in this type of work, or

(b) A degree in Electrical Engineering but whose experience in this field is limited.

In either case appropriate Membership of the Institution of Electrical Engineers is desirable.

EXPERIENCED MECHANICAL DRAUGHTSMEN

(Ref 404/7)

Applications are invited from experienced Mechanical Draughtsmen for positions in the Turbine and the Diesel Departments. Previous experience in these particular fields is not essential provided general mechanical experience has been obtained.

The Company offers excellent prospects to the right men, good conditions of service and operates a contributory Pension and Life Assurance Scheme. Where appropriate, assistance will be given towards the expense involved in settling in the Bedford area.

Application forms can be obtained by writing (quoting the appropriate reference) to:

THE PERSONNEL MANAGER, QUEENS ENGINEERING WORKS, BEDFORD (S 219)

BRITISH RAILWAYS

ELECTRICAL FITTERS

required

For maintenance of electrical equipment on the Distribution Section of the Eastern Region Electric Traction system in the London Area. Applicants must have served a recognised apprenticeship. Experience with H.V. switchgear and/or control system an advantage. Shift working is involved. Rate of pay is the equivalent of £11 0s 9d per standard week of 44 hours, plus appropriate shift allowance which averages 33s per week, and enhanced pay for overtime and Sunday duty. Certain free and reduced rate rail travel facilities. Pension and Sick Pay Schemes. Prospects of promotion. Applicants will be required to undergo medical examination. Apply in writing giving details of age, experience, etc., to the

Electric Traction Engineer,
(London Area)
British Railways, Eastern Region,
off Ley Street,
Ilford, Essex.

(S 229)

CENTRAL ELECTRICITY GENERATING BOARD

Southern, South Western and South Wales Region

SENIOR ASSISTANT
(TECHNICAL ADMINISTRATION)

Applications are invited for the post of SENIOR ASSISTANT (TECHNICAL ADMINISTRATION) in that section of the Regional Secretary's Organisation allocated to the Regional Research and Development Department located at Portishead, near Bristol.

The duties of the post are wide and, under the general supervision of the Principal Assistant, will include co-ordination of research proposals, economic assessment of research projects, cost control, compilation of progress systems and the preparation of progress reports, etc. In addition, the successful candidate will be required to deputise for the Principal Assistant (Technical Administration) in his absence.

Candidates should preferably be science graduates and have had experience in administration or technical information work. Qualities of adaptability and ability to analyse and present from mass information are sought.

The salary for the post will be within the range:—

£1,150/£1,240 per annum

Assistance may, under certain conditions, be given with housing.

Applications on Forms AE6/ACT, obtainable from the Regional Secretary,

CENTRAL ELECTRICITY GENERATING BOARD

Southern, South Western and South Wales Region

1 EATON CRESCENT, CLIFTON, BRISTOL 8

should be returned so as to reach him by not later than Monday, 24th October, 1960, quoting Vacancy No. 82.E. (S 216)

THE ENGLISH ELECTRIC COMPANY LIMITED

PROFESSIONAL ENGINEERING APPOINTMENTS

are available with the Switchgear Organisation of this Group on a range of Application and Contract Engineering duties. Experience in the manufacture, power generation and supply, or in the utilisation of electricity is sought, and professional engineers are invited to apply for consideration.

A number of vacancies also exist for younger engineers with Higher National Certificate in electrical engineering and preferably having served an engineering apprenticeship, which offer opportunity for acquiring experience, and scope for advancement and training as professional engineers.

All appointments are pensionable after a qualifying period.

Apply stating age, experience and qualifications to Dept. G.P.S., English Electric Hse, Strand, London W.C.2, quoting reference ET 401Q.

(S 251)

APPOINTMENTS WANTED

ADVERTISER seeks post with electrical firm, southern area, 30 years' electrical experience of all types of installations, measuring, ordering, records and office experience.—Box No. 8023, Electrical Times. (S 203)

MANAGER in complete charge of Electrical Contracting Business with turnover of £80,000, seeks similar post in S.W. London area.—Box No. 8021, Electrical Times. (S 202)

YOUNG MAN, O.N.C. (ELECT.), continuing studies, experienced control gear, D.O. test, etc., seeks interesting post with scope for experience and advancement. Lab, D.O, sales, etc., considered. Salary: £850. London Area.—Box No. 8007, Electrical Times. (S 139)

WORK WANTED

A.C. and D.C. MOTOR REWINDS and REPAIRS. Prompt service, fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co. Ltd., Stanmore, Middx. (S 2)

EXCAVATION, CABLE LAYING, JOINTING, etc. Estimates free, prompt attention. All work guaranteed 12 months. Anywhere in Lincolnshire, Norfolk, Suffolk, Rutland, Cambridgeshire preferred but not essential.—W. T. Parker Ltd., 113-115 Station St, Burton-on-Trent, Staffs. (S 143)

METALWORK.—All types of cabinets, chassis, racks, etc., to your own specification.—Philpotts Metalworks Ltd., Chapman St, Loughborough. (S 11)

INFRA RED
HEATING AND DRYING

For Industrial Processes

GEORGE VOKES (INFRA RED) LTD.

90 WARDOUR STREET, LONDON, W.1.
and
INFRA RED WORKS, HIGH ROAD, N.11.
GERrard 2732 ENTerprise 4684

(S 27)

WANTED

WANTED for prompt cash, ferrous and non-ferrous SCRAP: also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper Ltd., 17 Brady St, Bethnal Green, E.1. (S 1)

DIESEL GENERATING PLANTS WANTED!!! Price and particulars to Speed Electrics, Church St, Basford, Nottingham. Tel. 75716. (S 105)

FOR SALE

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co. Ltd., Honeypot La, Stanmore, Middx. Edgware 5566/9. (S 4)

A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—Chi 5105, 7 Rothschild Rd, W.4. (S 3)

A.C. and D.C. SLOTMETERS: Time Switches and Quarterly Meters. Single and polyphase, 2½—100 amps. Tested and guaranteed 2 years. Television and Billiards Meters. — Tradex Meter Co., Surbiton. Elmbridge 2234/5/6. (S 9)

BROOKS 60 h.p. a.c. 3-PHASE MOTOR, 580 r.p.m., complete with starter equipment, slide rails, pulley and 20 ft belt drive. £65 o.n.o. Inquiries to Senior and Godwin, Chartered Surveyors, Sturminster Newton (Tel. 244), Dorset. (S 257)

ELECTRIC MOTORS, D.C. and A.C. Motor Generator Sets, Alternators and Dynamos, Diesel Sets, Circuit-breakers, Switchboards, reconditioned and guaranteed. Very large stocks held.—Britannia Manufacturing Co. Ltd., Britannia Walk, N.1. CLErkenwell 5512-3-4. Stores at Chobham, Surrey. (S 7)

HOUSE-SERVICE METERS, A.C. or D.C., quarterly or prepayment.—Universal Electrical, 221 City Rd, London, E.C.1. (S 5)

HOUSE-SERVICE METERS, all types can be obtained by return from Selectrics, Dept., E.T., Meter Hse, Factory Row, Castle Circus, Torquay. Phone 7218. (S 8)

IF you require d.c. current at 30 kV to 40 kV please note: For Sale Ferranti Oil Cooled TRANSFORMER RECTIFIER, input 400/1/50, output 20 kV to 40 kV at 375 mA, complete with controls and instruments, suitable for electrostatic precipitation, etc. Unused, low price.—L. Solloman Ltd., Beaufort St, Manchester 3. Phone: BLAckfriars 4571. (S 20)

PURLEY CHOKES AND BALLASTS. Our 80 W tapped h.p.f. ballast with starter switchgear-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s 6d each subject. —F. W. Blanshard Ltd. (Dept. E.T.). Purley, Surrey. Uplands 4818/9. (S 6)

SECOND-HAND electrical plant can be as good as new if you buy it from specialists. Write for our stock list. Dynamo and Motor Repairs Ltd., North End Rd, Wembley Park, Middx. Telephone: Wembley 3121: Soho Rd, Handsworth, Birmingham. Telephone: Birmingham Northern 0898 (S 10)

EDUCATIONAL

GUARANTEED COACHING for CITY AND GUILDS EXAMINATIONS—Electrical Engineering Practice; Electrical Installation Work and Illumination Engineering. Also many practical non-examination courses. No books to buy. Write for FREE Prospectus, stating subject, to I.C.S., Intertext Hse, Parkgate Rd (Dept. 430), London S.W.11. S 13)

Safeguards against the
Explosion Hazard in Industry

Bound in a stiff cover, consisting of 90 pages complete with illustrations, diagrams and tables, overall size 7½" x 4½"

Price **6/-** *post free*

The ELECTRICAL TIMES Ltd

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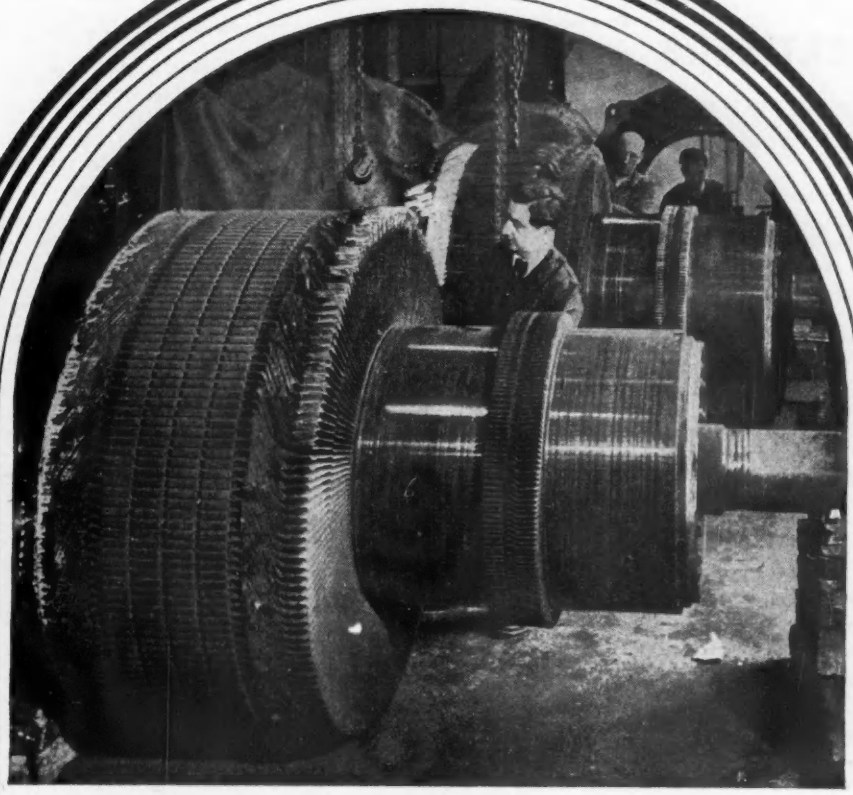

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INDEX TO ADVERTISERS

Aerialite Ltd. 66
Aircraft-Marine Products (Gt. Britain) Ltd. 27
Alberice Meter Co. 68
Alcan (U.K.) Ltd. 7
Allen, John, & Sons (Oxford) Ltd. ... 62
Ashley Accessories Ltd. 23
Associated Electrical Industries Ltd. (Cable Division) ... ... *Cover* (i)
Associated Electrical Industries Ltd. (Instrumentation Division) 34
Associated Electrical Industries Ltd. (Motor Control Gear Division) ... 6
Associated Electrical Industries Ltd. (Switchgear Division) 42
Austin Taylor Electrical Ltd. 32
Avo Ltd. 1

Backer Electric Co. Ltd. 35
Beverley Fibreglass Products 28
British Electrical Repairs Ltd. *Cover* (iii)
British Klockner Switchgear Ltd. ... 66
Brookhirst Igranic Ltd. 33
Brush Electrical Engineering Co. Ltd.... 61
Bullers Ltd. 67
Bullfinch (Gas Equipment) Ltd. ... 54

Central Electricity Generating Board... 20
Collins Electrical Ltd. 51
Critchley Bros. Ltd. 35

Dowling, David, Ltd. 59
Dorman & Smith Ltd. 26

East London Mica Works 5
Electrical Times Ltd. 50, 52, 68
Electric Construction Co. Ltd.... ... 12
Enfield Standard Power Cables Ltd. ... 3
English Electric Co. Ltd. 31
Everett Edgcumbe Ltd. 29

Ferranti Ltd. 11

Geipel, Wm., Ltd. 28
General Electric Co. Ltd. ... 9, 55
Gent & Co. Ltd. 70
Griffith, Gilbart, Lloyd & Co. Ltd. ... 28
Grover & Co. Ltd. 62

Hackbridge & Hewittic Electric Co. Ltd. 41
Hardy & Padmore Ltd. 68
Harvey, G. A., & Co. (London), Ltd. ... 4
Holophane Ltd. ... ... *Cover* (ii)

Injection Moulders Ltd.... 54

Leicester Lovell & Co. Ltd. 57
London Electric Wire Co. & Smiths Ltd. 53
Lyons, Claude, Ltd. 60

Metway Electrical Industries Ltd. 16, 59, 68
Midland Electric Manufacturing Co. Ltd. 40

M.K. Electric Ltd. 63
Moffats Ltd. 14, 15

Ottermill Switchgear Ltd. 17

Pullin, R. B., & Co. Ltd. 16

Reyrolle, A., & Co. Ltd. 24
Rists Wires & Cables Ltd. 10
Rotunda Ltd. 64

Salter, Geo., & Co. Ltd. 38
Shell-Mex & B.P. Ltd. 18, 19
Simon-Carves Ltd. 69
Sims, F. D., Ltd. 62
Smith Meters Ltd. ... ... *Cover* (iv)
Smith & Nephew Ltd. 2
Statter, J. G., & Co. Ltd. 25
Steatite & Porcelain Products Ltd. ... 56

Tempered Spring Co. Ltd., The ... 5
Tirfor Ltd. 32
Turners Asbestos Cement Co. Ltd. ... 36

Unistrut Division of Sankey Sheldon Ltd. 30

Venner Ltd. 37
Volex Electrical Products Ltd. 8

Wandleside Cable Works Ltd. ... 65
Westinghouse Brake & Signal Co. Ltd. 13
Wootton & Co. Ltd. 60

Yarrow & Co. Ltd. 58

Zenith Electric Co. Ltd., The 64

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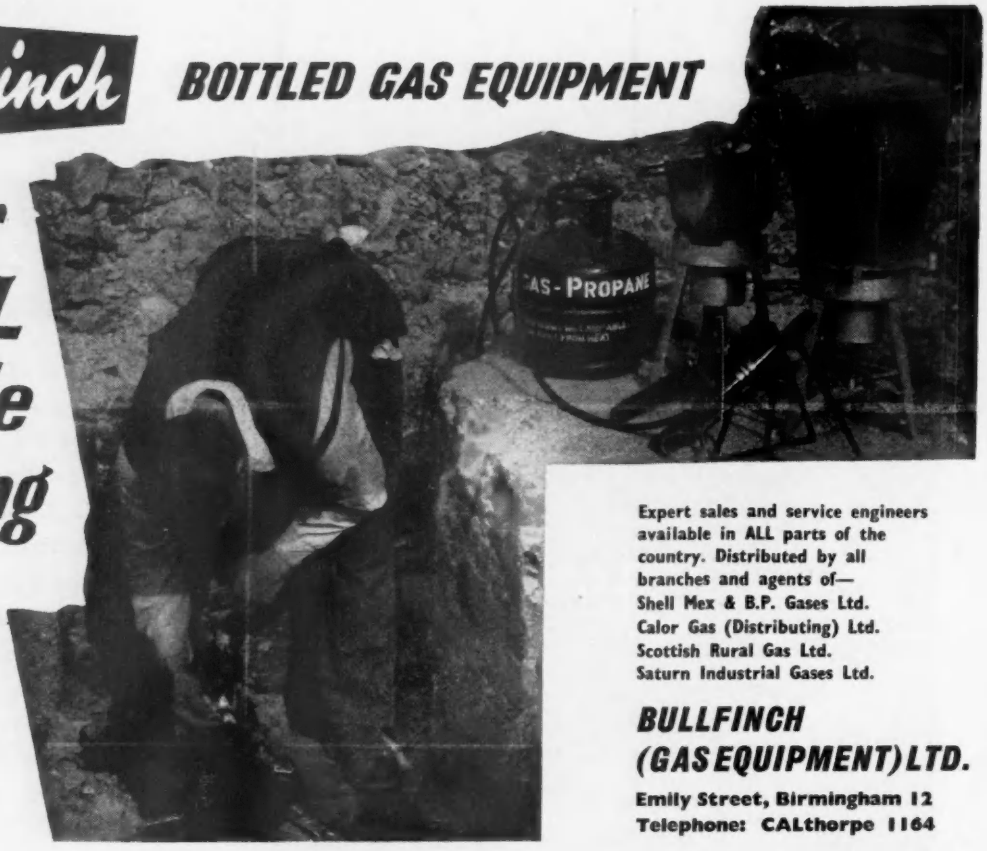

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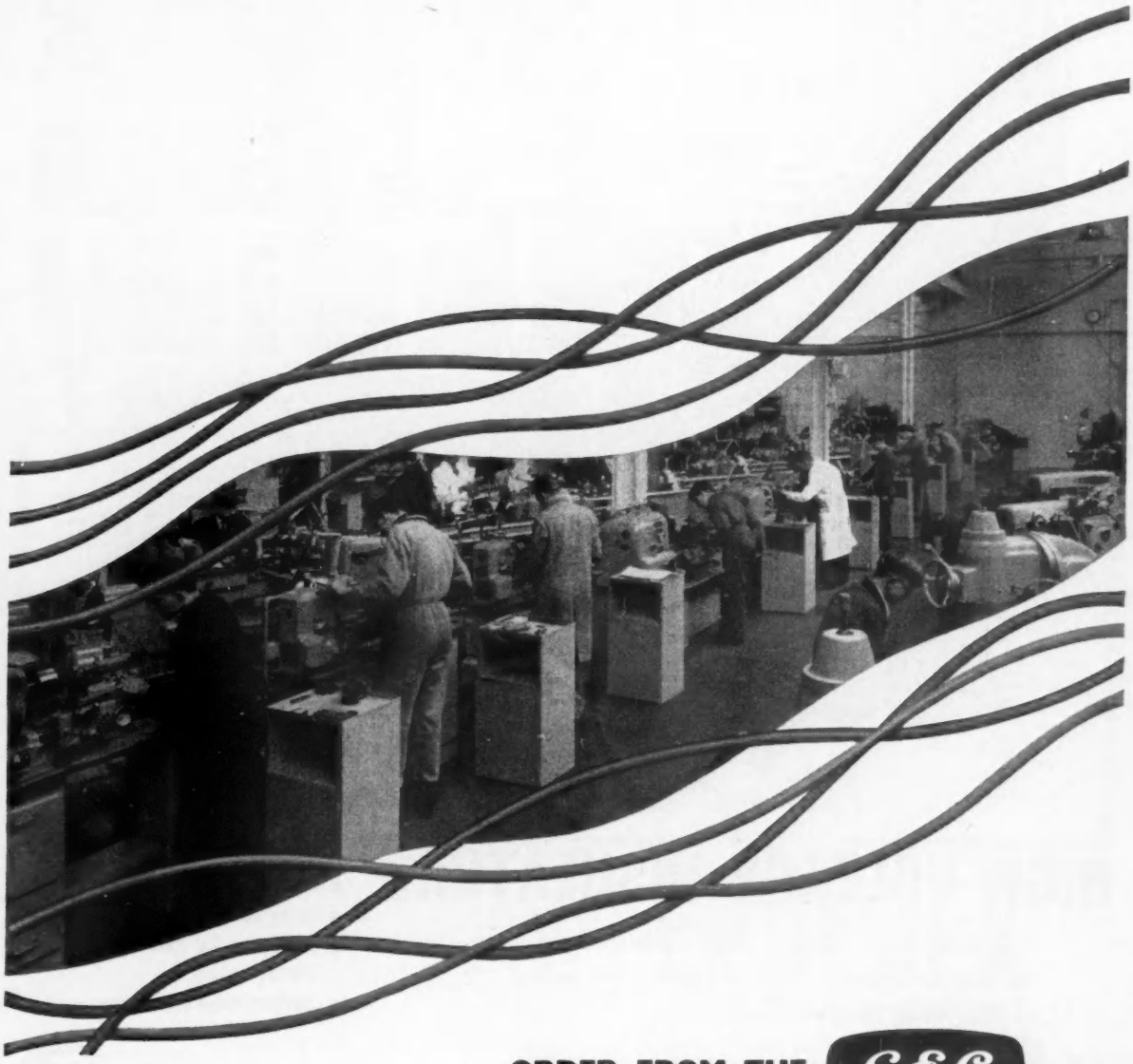

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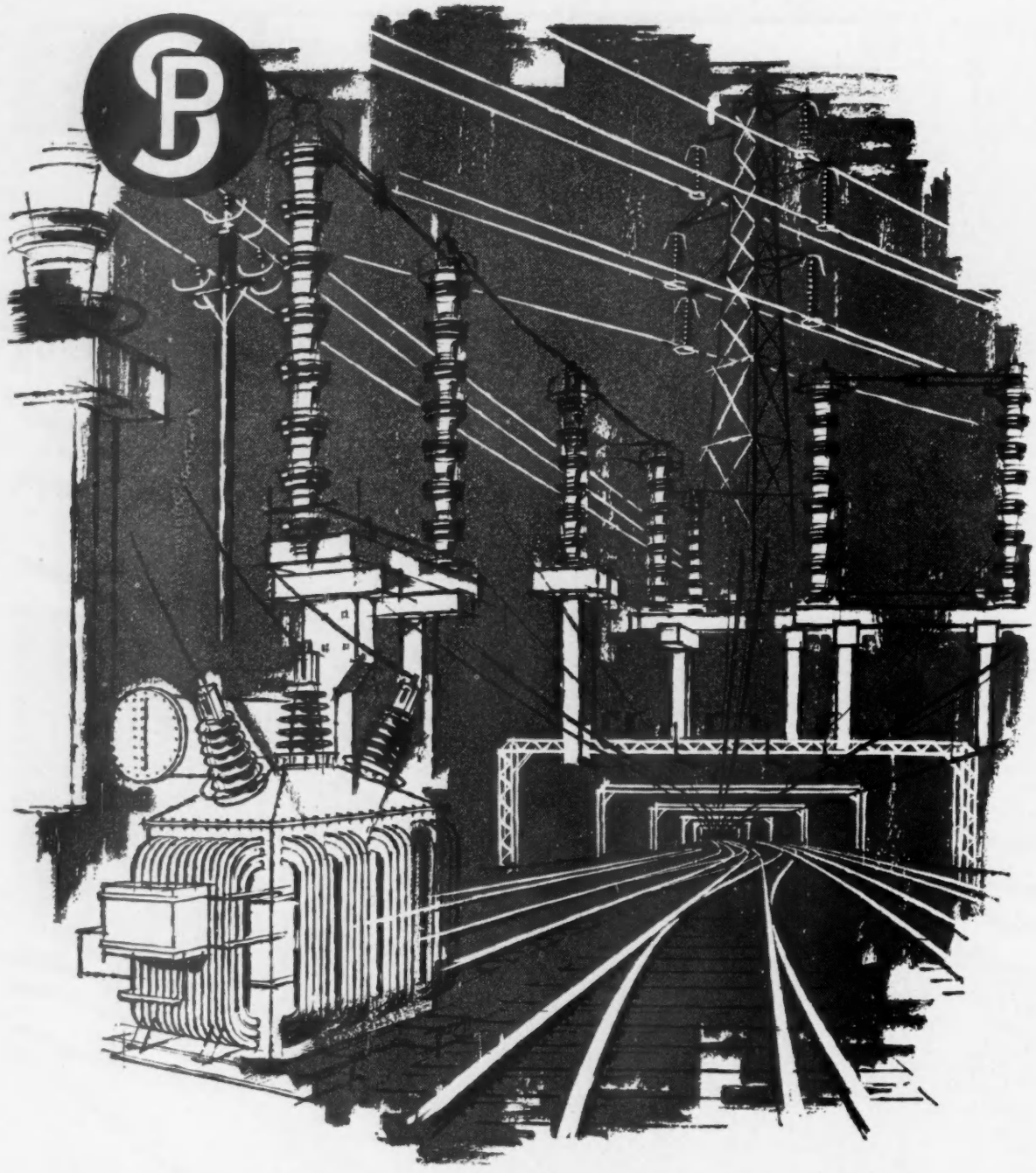

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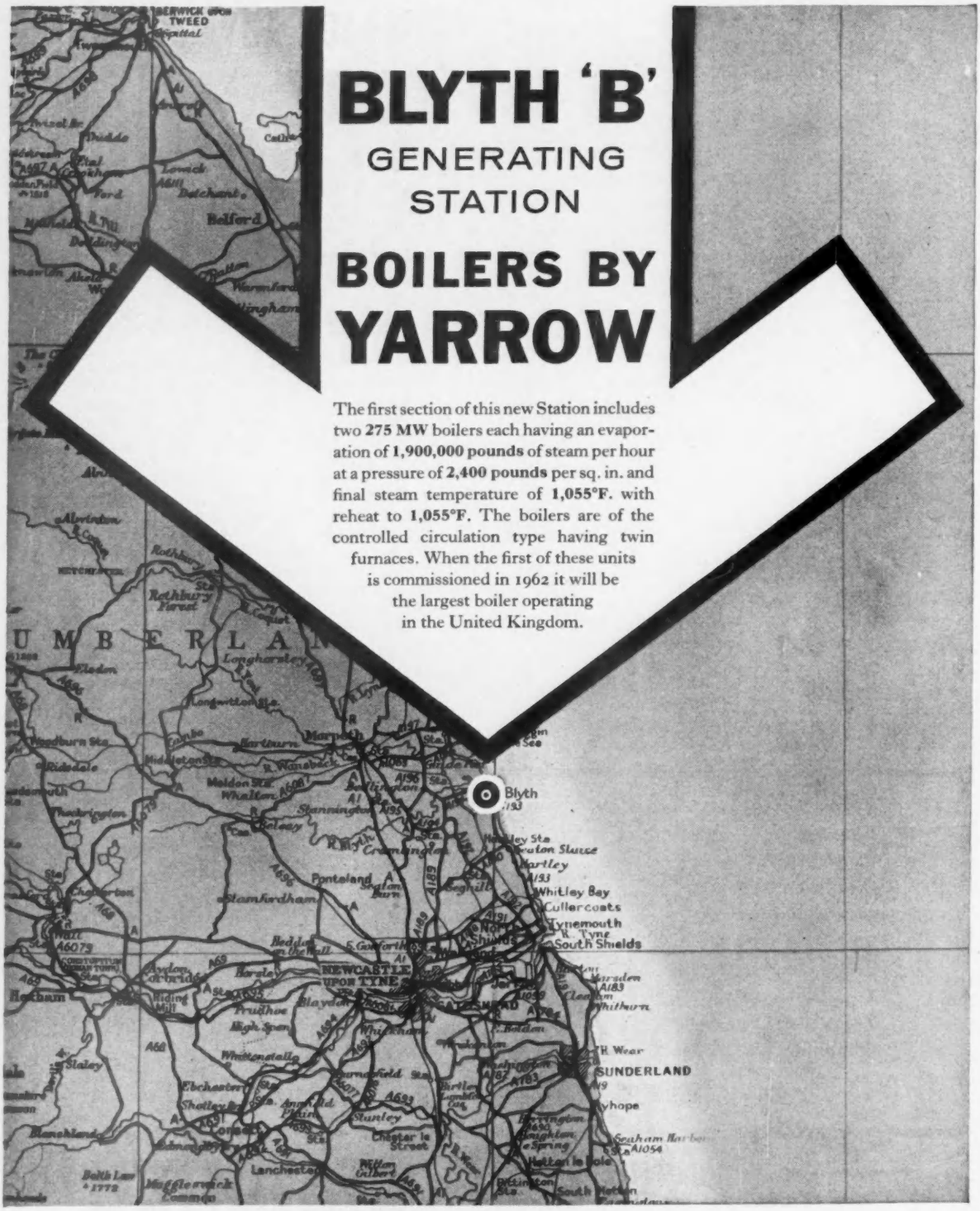

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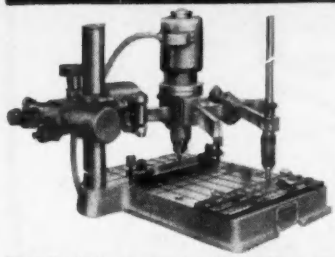

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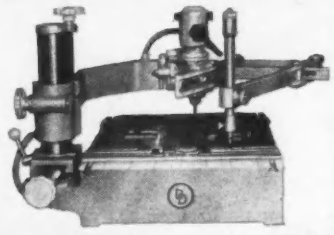

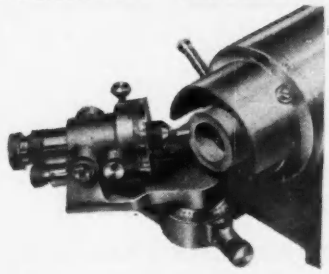

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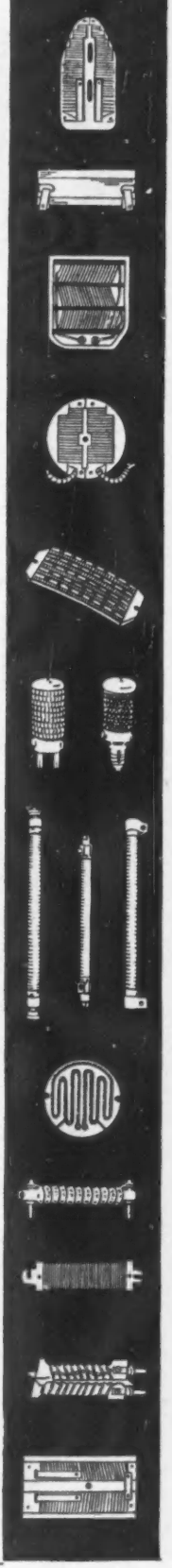

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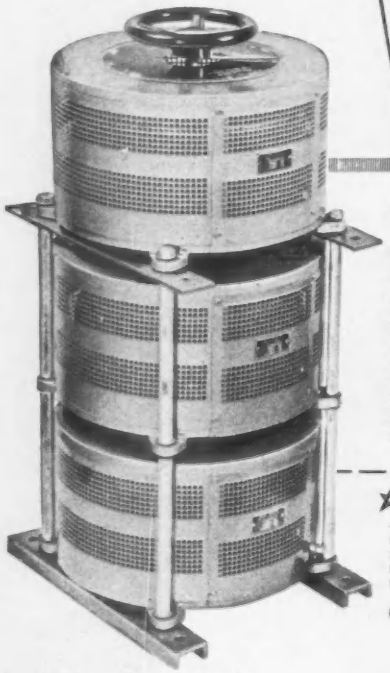

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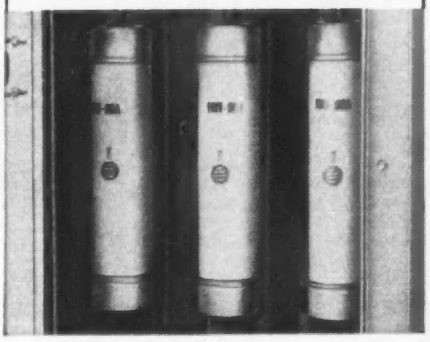

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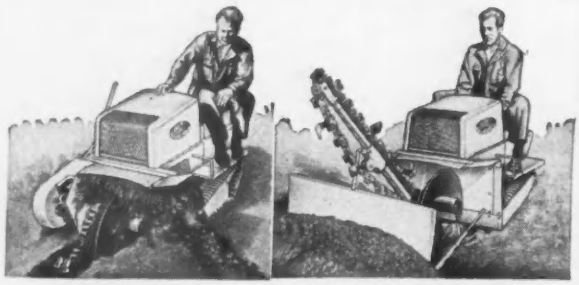

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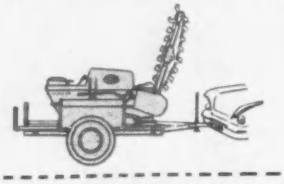

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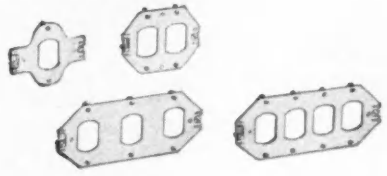

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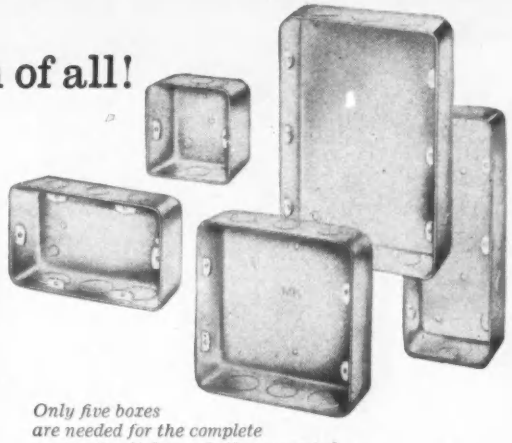

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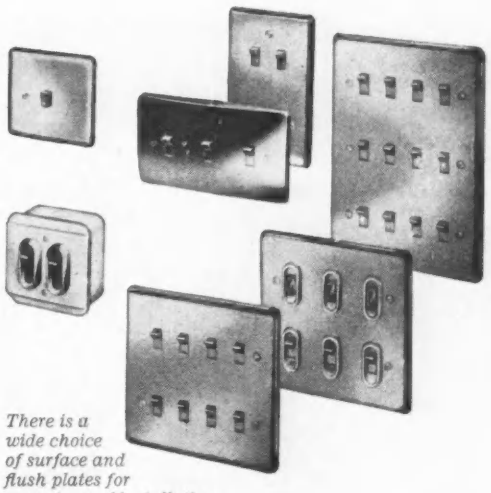

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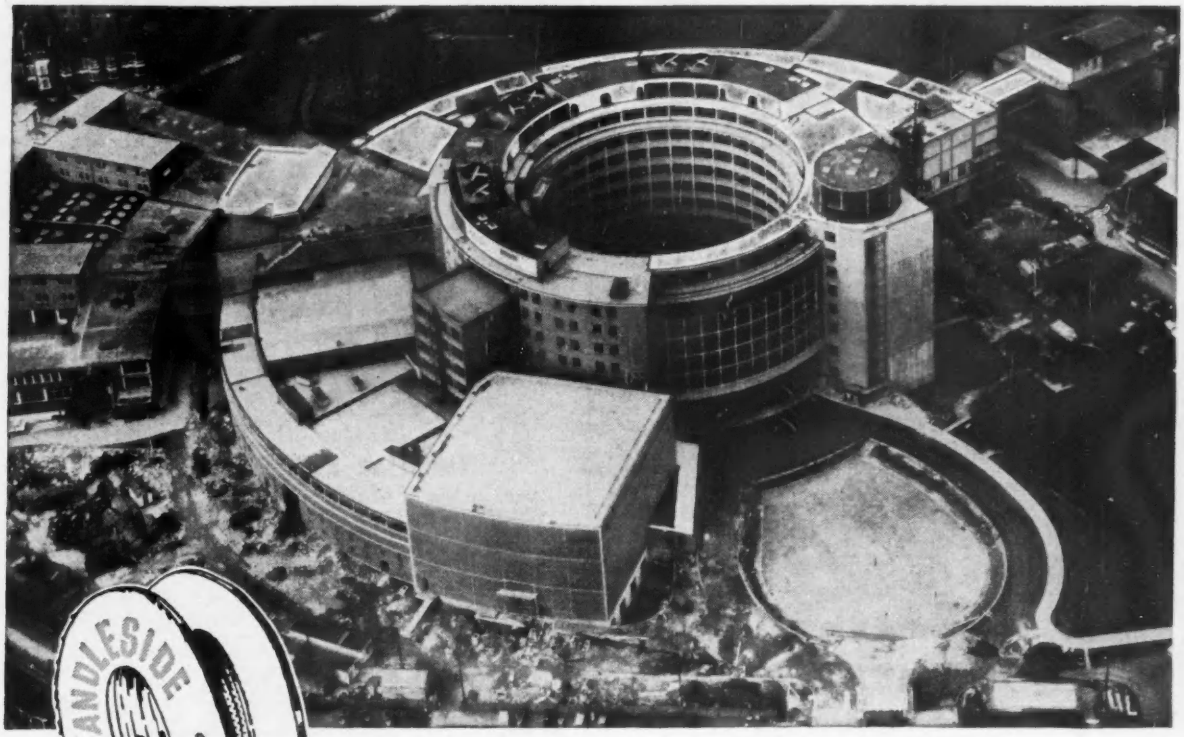

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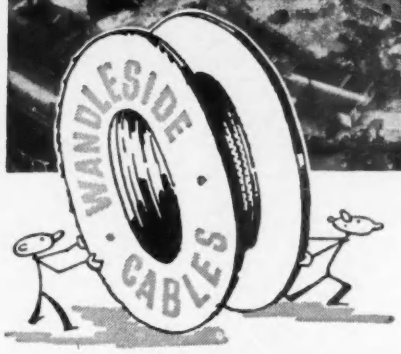

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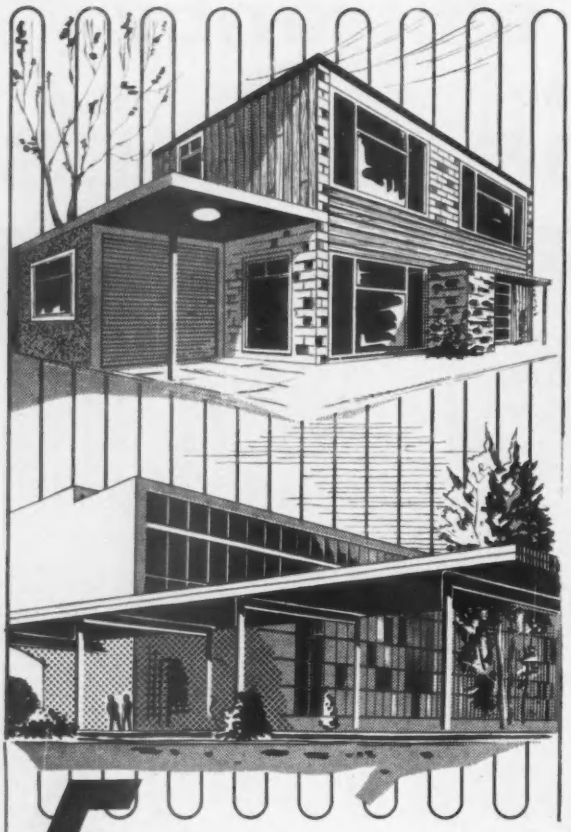

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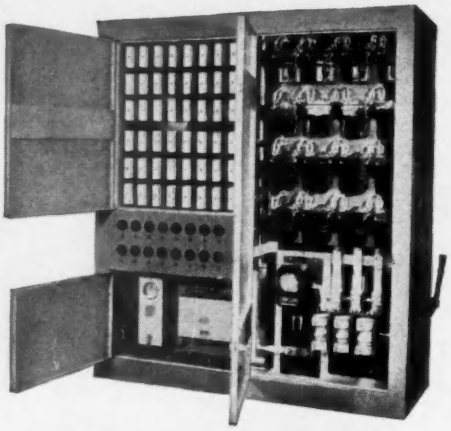

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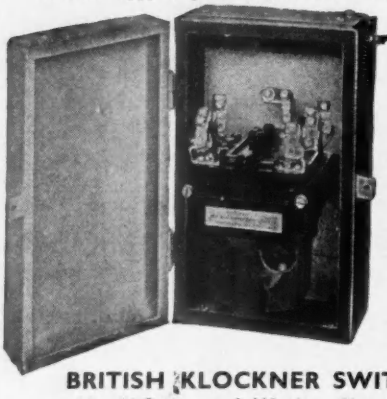

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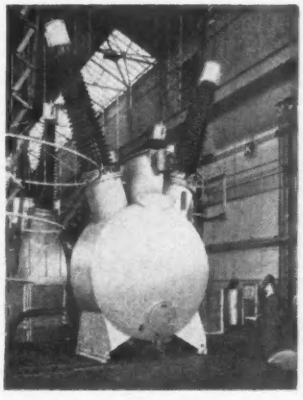

The illustrations show a complete 330 kV. bushing insulator and a 330 kV. circuit breaker, by courtesy of the AEI Ltd.

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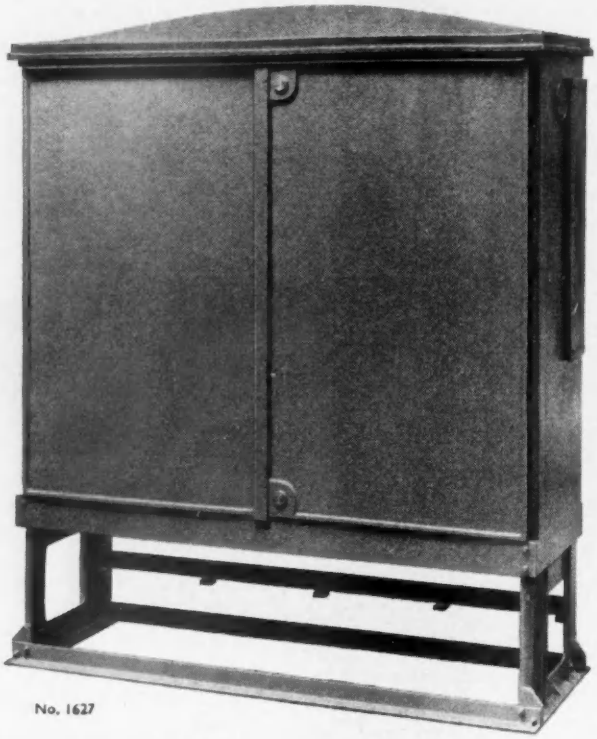

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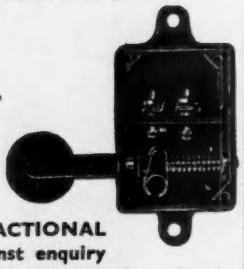

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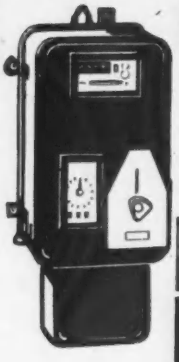

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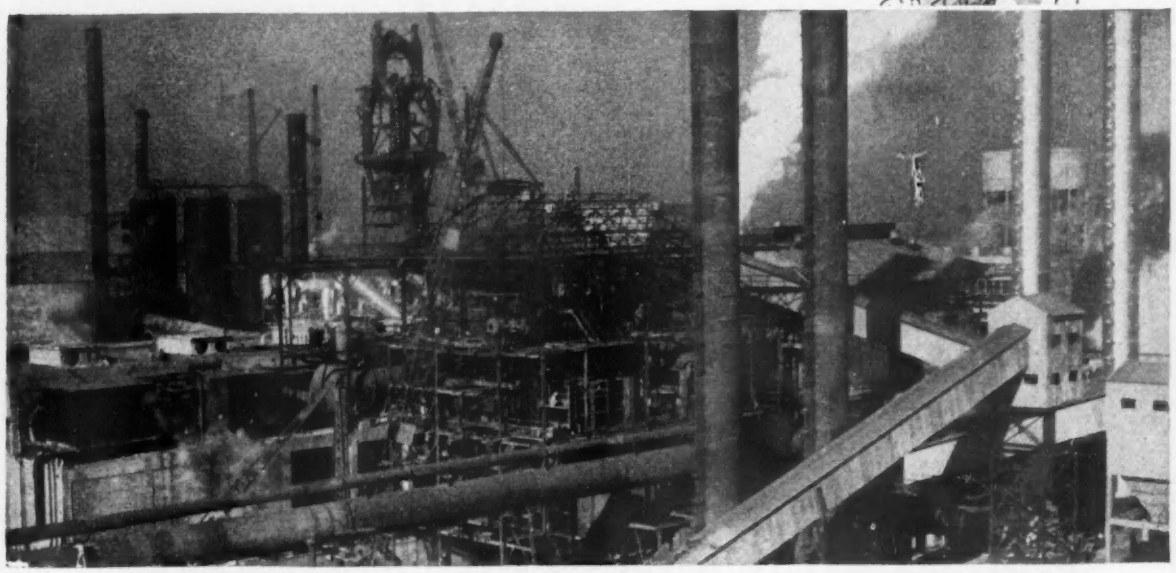

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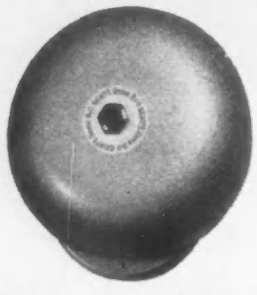

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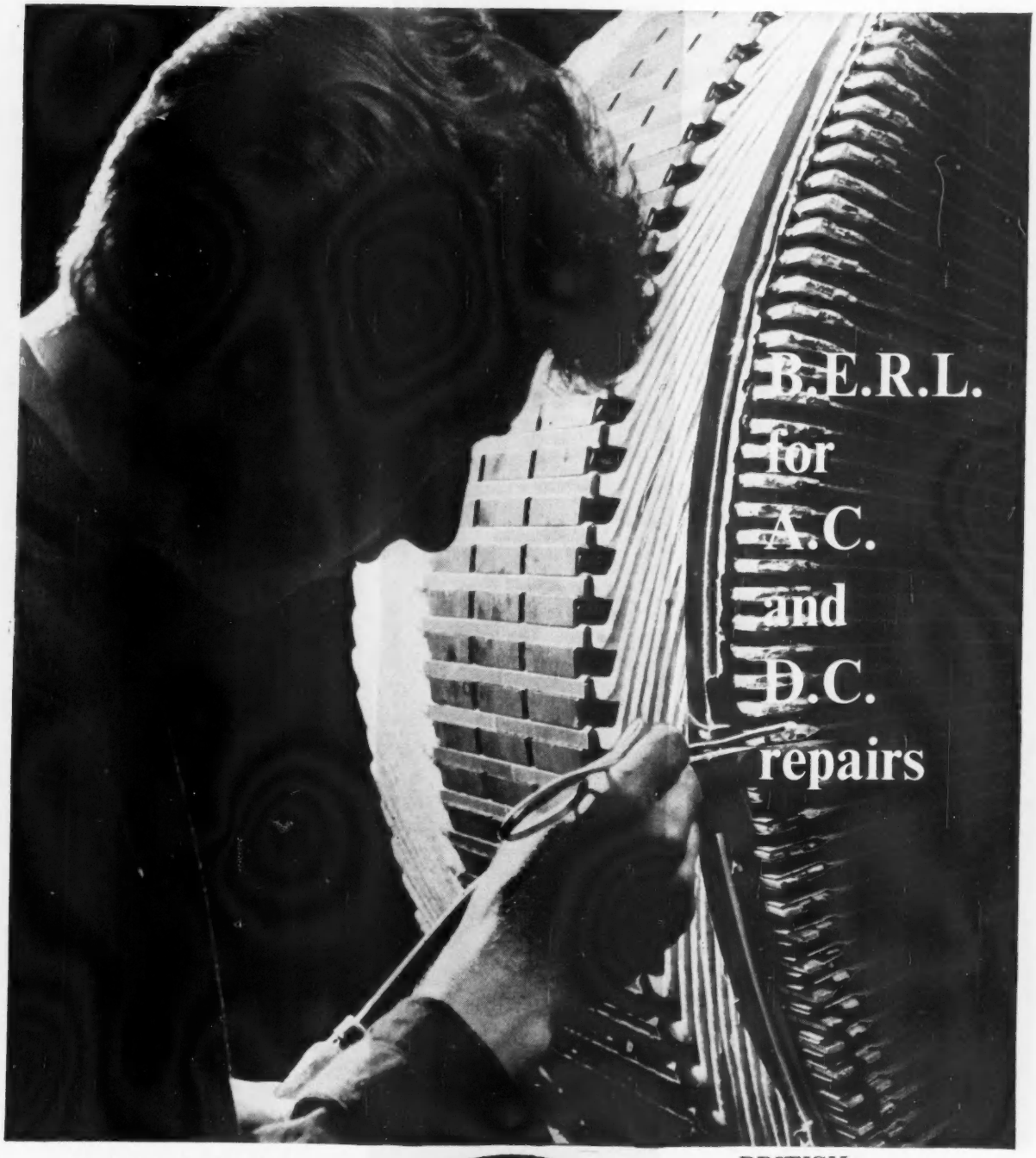

The illustration shows the soldering of the winding to commutator risers of a 1250 kW., D.C. generator armature.

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